OCTOBER 15, 1947

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AUTOMOTIVE INDUSTRIES

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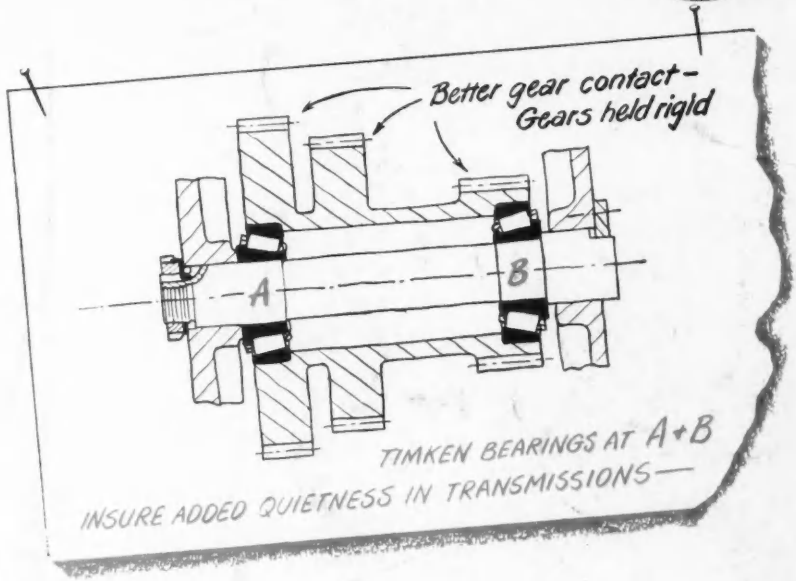

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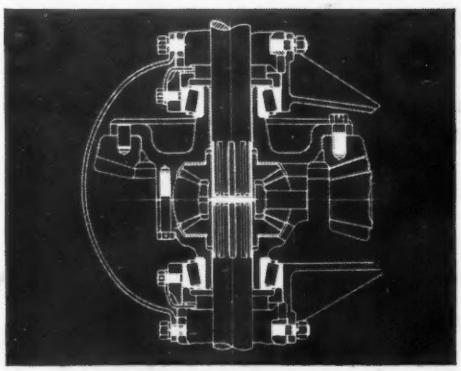

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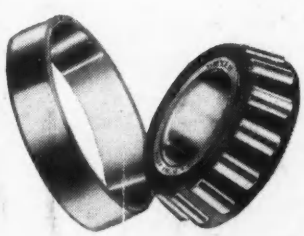

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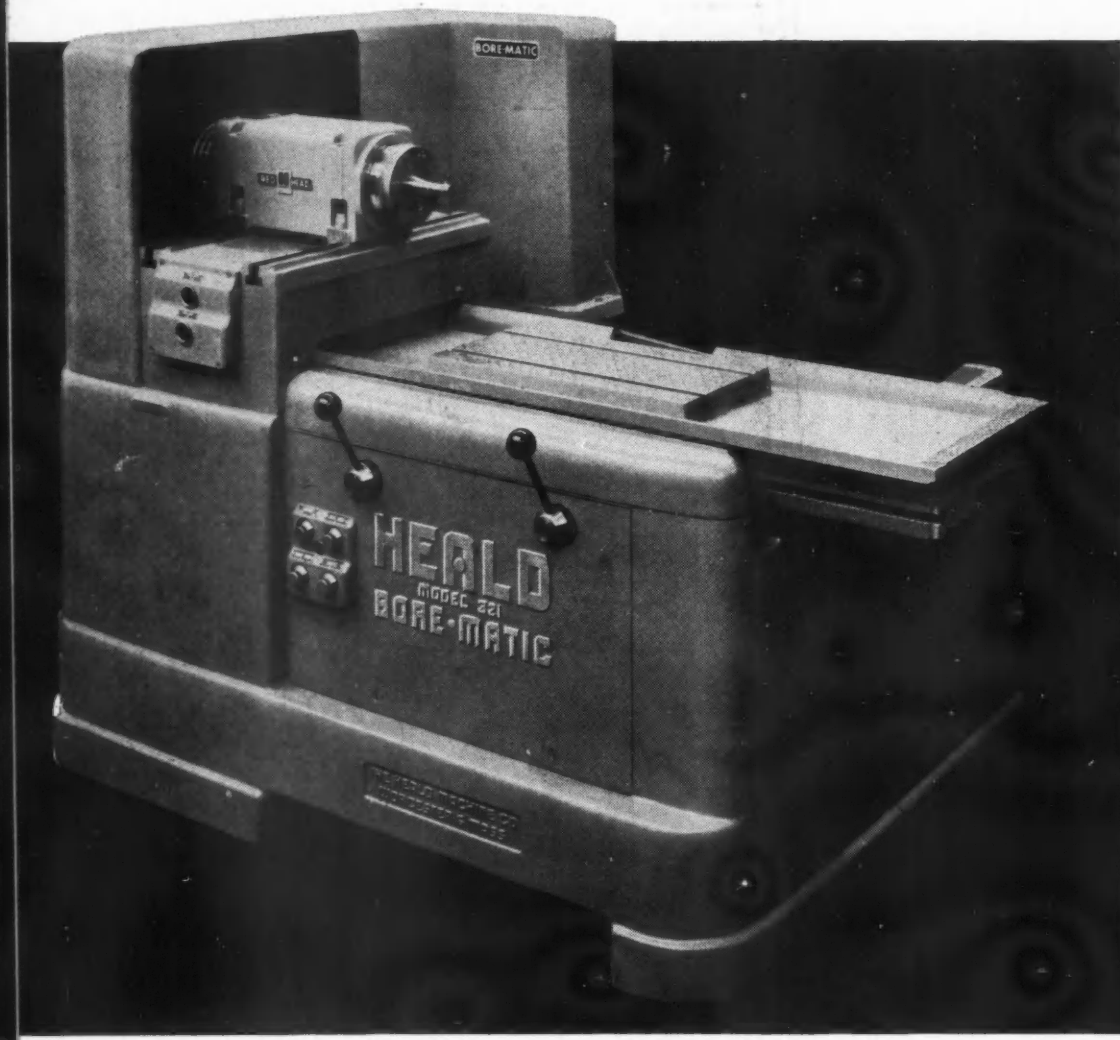
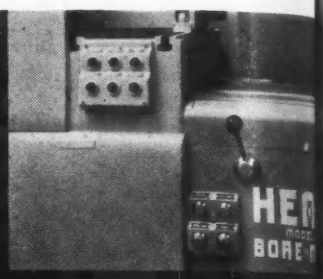
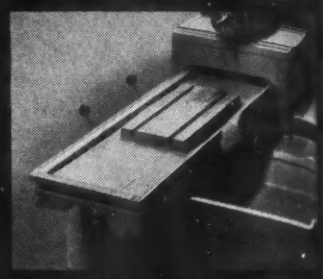
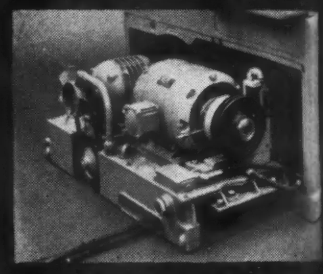




Centralized controls and a able table dogs



Large chip pan for chips cutting fluid



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AUTOMOTIVE INDUSTRIES

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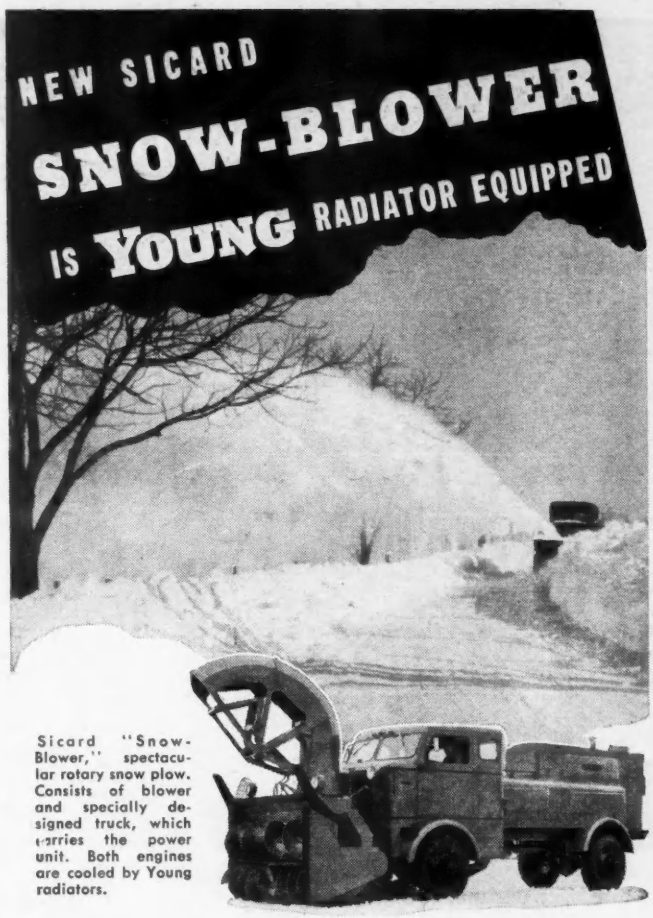

Sicard "Snow-Blower," spectacular rotary snow plow. Consists of blower and specially designed truck, which carries the power unit. Both engines are cooled by Young radiators.

If you've ever bent your back over a few inches of snow on the sidewalk, you know that snow-removal is "hot" work. It's easy to imagine the tremendous power necessary to scoop up huge drifts of snow and blow them as far as 150 feet. Such effort puts an extreme load on both truck and power unit. This unique machine, developed by Sicard, Limited, of Montreal, Quebec, employs two Young radiators: one to cool the truck engine—the other to regulate the jacket water temperature of the blower power unit.

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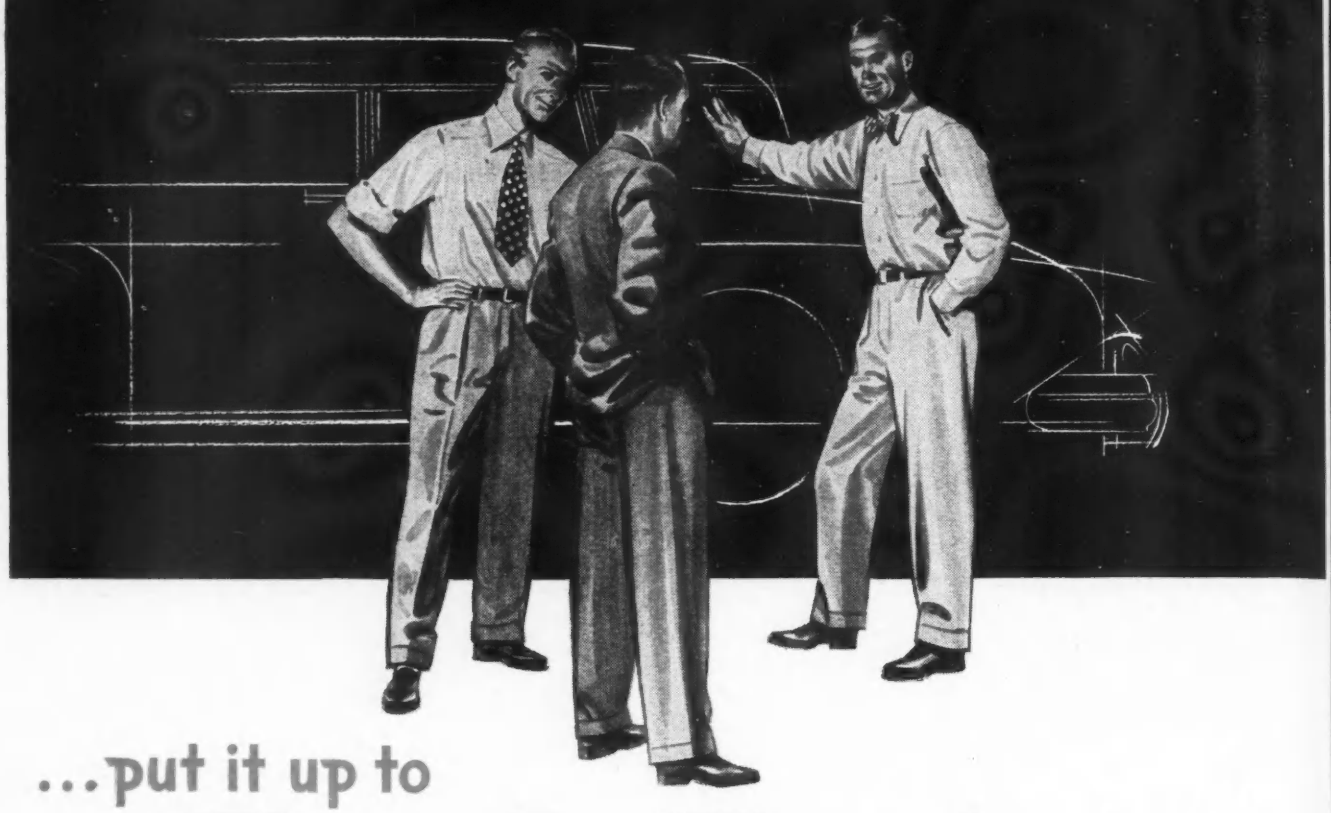

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WORLD'S LARGEST INDEPENDENT AUTOMOTIVE PARTS PLANT

AUTOMOTIVE INDUSTRIES

Published on the first and 15th of the month

October 15, 1947
Volume 97, No. 8

Some High Spots of this Issue

Latin America's Growing Aircraft Industry

An extensive analysis of South America's small but growing aircraft industry is presented in an article beginning on page 24. The author, George M. Galster, obtained his material by actually visiting the South American countries, touring aircraft factories and interviewing government officials.

Cadillac's New Electroplating Department

Cadillac's electroplating department has been moved from its former location across the street from the assembly building to a more advantageous position along the final assembly line. This article by Joseph Geschelin describes their new facilities for chromium plating external parts. Page 28.

New Caterpillar Diesel Engine, Tractor and Motor Grader

The Caterpillar Tractor Co. has placed in production a new four-cylinder Diesel engine, a new Diesel track-type tractor and a Diesel motor grader. Complete details and specifications are given on pages 30 and 31.

SAE National Tractor Meeting

Abstracts of several outstanding papers presented at the recent SAE National Tractor Meeting, covering such subjects as production innovations in manufacturing the Farmall Cub, advantages of liquid petroleum gas as an engine fuel, and an analysis of the tractor seat problem, are given on pages 32-36.

Small Vehicles

A wide variety of small vehicles, from 10-hp midgets to 40-hp light cars, have made their appearance in the automobile industry. Nearly all of these diminutives, with the principal exception of Crosley, are newcomers to the field; but the demand for them is large, and the new manufacturers are making expansive plans for their production. Latest information on these small-vehicles is given in an article beginning on page 44.

27 New Production Equipment and New Product Items And Other High Spots Such As:

Reo's new Flying Cloud bus; volume of U. S. exports to Mexico for 1941-46; automatic milling machines at Douglas; an abstract of M.E. Coyle's talk on the outlook in the automobile industry; and highlights of papers presented at the SAE National Aeronautical Meeting.

Comprehensive Interpretation of News of the Industries, Page 17

For Complete Table of Contents, See Page 3

AUTOMOTIVE INDUSTRIES

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Most steel buyers are accustomed to specifying alloys on the basis of analysis alone. But there's a better, surer way of buying that's gaining more followers daily—specification of Ryerson alloys by analysis *and* minimum hardenability requirement. Either one alone isn't enough. Together they give double assurance that your steel will measure up to performance demands.

You can order this way from Ryerson because we test every heat of annealed and as-rolled alloy in stock. Establish the heat treatment response for every shipment by end-quench hardenability tests. Then, when you specify the mechanical properties you must have after heat treating, we select bars that, on the basis of actual tests, will do the job.

This system of purchasing can effect important savings for your company. It protects against expensive product failure and practically eliminates the possible necessity of replacing unsuitable material. Ryerson assures delivery of alloy steel that will amply meet your minimum hardenability requirements.

And to prove that you can get the desired performance, we send a Ryerson Alloy Report with every shipment. Charted test results and mechanical properties interpreted from them confirm the steel's hardenability and guide you in obtaining the desired heat treatment results.

Hardenability is nothing new with Ryerson. It's been a Ryerson service for ten years now. If you have yet to order on this basis why not investigate the advantages? Thousands of tons of tested Ryerson alloys are awaiting your call.

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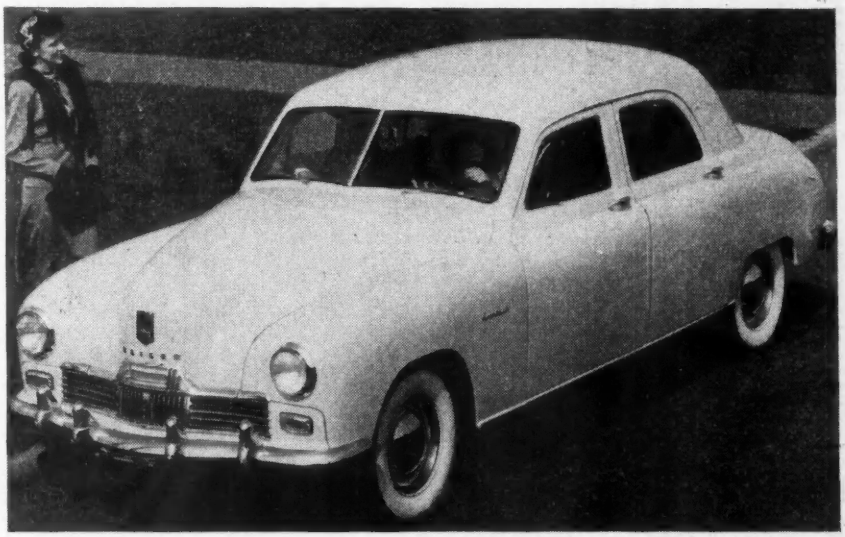
Vol. 97, No. 8

NEWS of the AUTOMOTIVE INDUSTRIES

October 15, 1947

Current Output Raises Hope for 5 Million Year

Estimates of total automobile and truck production for the year 1947 seem to rise and fall in direct relation to weekly output. In late August, when production was falling far short of 100,000 units a week, there was hardly a voice predicting production this year of more than 4.7 million units. However, in late September, after three consecutive weeks in which production went well over the 100,000 mark, M. E. Coyle, GM executive vice president, estimated that total production this year should be about five million units which would be second only to the all-time high of 5,358,420 vehicles turned out in 1929. Up to Sept. 1 of this year, the industry turned out 3,252,250 units which would leave about 1,750,000 vehicles to be built in the last four months of this year, or an average of 437,500 units a month.



Kaiser Custom

Recently introduced by Kaiser-Frazer Corp., the Kaiser Custom, a de luxe four door sedan identical with the Kaiser in principal mechanical features and body lines, gives buyers a wide choice of interior and exterior color combinations, built-in accessories, chrome trim, and upholstery fabrics.

Hudson Considers Extending Truck Line to Larger Sizes

It is reported that Hudson is considering extension of its truck line into the ton and ton-and-one-half field. Nothing definite has been decided, but the plan is under consideration. The current ¾ ton pickup model will undergo considerable change in cab design late this year and will feature the same bold advance in styling the company plans for its passenger car, namely, low wide sweeping lines. Packard is another company that has been thinking about entering the truck field. The current shortage of materials thus far has stymied a decision, but when materials are again available in ample quantity, the company will study market possibilities with a view toward introducing a line of trucks.

Ford to Build Million Cars and Trucks in '47

Ford will build about one million cars and trucks this year, according to Albert J. Browning, director of purchasing. He said that production during the last half of 1947 will not come up to the first six months output because of the steel shortage. Because of the model changeover next year, output for the first half of 1948 will not equal that for the same period this year. Ford built slightly more than a half million cars and trucks during the first six months of 1947. Mr. Browning also said that production next year should be about ten per cent greater than the figure achieved in 1947. He added that the new model will require considerably less steel than current models.

High Compression Engine Interests Truck Builders

Although most discussion about the high compression engine has been centered around the passenger automobile, two major truck builders are said to be very much interested in the engine for early adoption. One consideration is that fleet operators with their bulk buying opportunities would probably have a better chance to get the higher octane fuel before it is generally available to the public in quantity. It also is reported that further tests with the high compression engine indicate that first performance figures given were, if anything, on the conservative side. At the time details of the engine were released in June an increase of about 30 to 35 per cent the efficiency of the conventional engine was cited.

K-F Prices New Custom At $2301 Factory List

Price of the new Kaiser custom, newest addition to the Kaiser-Frazer line, has been set at $2,301 factory list. Kaiser-Frazer recently completed its 100,000th car, and if it is able to maintain its current rate of increase, will undoubtedly wind up the year as the largest independent producer. At ceremonies marking the completion of the 100,000th car, Henry Kaiser, chairman of the board, said the company will be building 1500 cars a day by next summer and that plans are afoot to have assembly plants in several localities throughout the country. K-F made a new production record in September when it turned out 16,535 cars, more than 3000 above the previous record made in July. The October schedule calls for 18,000 units. The company recently took over its newly-acquired steel plant at Indianapolis Oct. 6, and

Motor Vehicle Factory Sales from U. S. Plants*

	Passenger Cars	Trucks	Buses	Totals 1947	Totals 1946	Totals 1941
January	246,605	99,818	1,273	347,696	101,867	499,448
February	267,015	105,042	1,303	373,360	93,042	484,891
March	301,525	118,234	1,421	421,180	124,003	510,122
April	314,765	106,984	1,650	423,399	214,350	464,301
May	284,357	96,430	1,853	382,640	243,104	518,746
June	307,124	91,810	1,628	400,562	201,902	520,892
July	279,631	97,814	1,806	379,251	297,633	445,784
August	261,158	86,509	1,757	349,424	247,261	144,726
Total—Eight months	2,262,180	806,641	12,691	3,077,512	1,097,065	3,588,910

Factory Sales to Domestic and Foreign Markets*

	Passenger Cars Domestic	Passenger Cars Foreign	Trucks Domestic	Trucks Foreign	Buses Domestic	Buses Foreign
January	226,695	19,910	77,434	22,384	1,115	158
February	245,081	21,934	83,276	21,766	1,090	213
March	280,018	21,507	92,082	26,152	1,272	149
April	291,953	22,812	83,515	23,469	1,465	185
May	261,240	23,117	75,696	20,734	1,599	254
June	284,576	22,548	73,803	18,007	1,409	219
July	257,881	21,750	78,503	19,311	1,694	122
August	240,358	20,800	66,405	20,104	1,572	185
Total—Eight months	2,087,802	174,378	630,714	171,927	11,216	1,475

* Data from Automobile Manufacturers Association.

will mechanize the operation completely in an effort to double the current output of 4000 tons a month of hot rolled sheet steel.

Big Three Not to Offer Automatic Transmissions

It now is fairly well established that automatic transmissions will not be found on any of the lower priced cars offered by the Big Three when 1948 models are announced. High costs and the difficulty of manufacturing in sufficient volume would seem to preclude that possibility. It is reported however, that Ford may have an overdrive unit available as optional equipment. It is known that Pontiac will offer the GM Hydromatic transmission as optional equipment with at least part of its production in 1948.

Two New Heavy-Duty Models Added to '48 Reo Truck Line

Amplified by the addition of two new heavy-duty models, 30 and 31, the 1948 Reo truck line is described by Reo Motors, Inc. as the most complete in the company's history. Capable of hauling loads weighing up to 76,000 lb, the new model 30 is powered by a six cyl Continental R-6513 valve-in-head engine, bore and stroke 4½ by 5⅜ in., developing 170 hp at 2600 rpm; Model 31 is powered by a six cyl Continental R-6602 valve-in-head engine, bore and stroke 4⅞ by 5⅜ in., developing 200 hp. With straight truck GVW up to 36,000 lb, wheelbases for Models 30-31 range from 145 in. for the A type to 165 in. for the B type with special wheelbases available for the C type.

The size and power of Models 30 and 31 has been emphasized in exterior appearance by special designing, and each has a full vision 75-in. cab. Basic Reo styling on Models C-19, C-21, C-22, C-23, and C-25 has been little changed. All of the 1948 Reos feature the variable rate spring system, providing proper springing whether the truck is empty or fully loaded.

Int'l Harvester Celebrates 100th Anniversary in Chicago

Portraying the history of agriculture, a lakefront exhibit to be held from Oct. 18 to Nov. 2 will commemorate International Harvester Co.'s 100 years in Chicago. Four tents, up to 350 ft in length, are being erected in the southeast parking area adjacent to Soldier Field to house the company's various equipment displays and exhibits.

Ford to Spend $18 Million For Expanded Steel Output

In a long-range move to balance its steel and foundry operations, Ford Motor Co. has embarked on an iron and steel production expansion program that will cost approximately $18 million. When completed, the program is expected to take Ford out of the steel scrap market altogether. The project will encompass four major objectives. A new blast furnace, expected to increase capacity 98 per cent, will be built and probably will be in operation by September of 1948. The company has purchased a skin-pass cold rolling mill from the Granite City Steel Corp. and expects to have it in operation at the Rouge by next March. Some of the present

Heavy Duty Reo

Designed to haul loads weighing up to 76,000 lb, Model 30 of the 1948 Reo line is powered by a six cyl valve-in-head engine with 513 cu in. displacement developing 170 hp, and Model 31 by a six cyl engine with 602 cu in. displacement developing 200 hp. The lines of these models emphasize their power and mass.

open-hearth furnaces will be rebuilt with an anticipated 25 per cent increase in capacity. To take care of the additional production, considerable investment will be made for materials handling equipment. The new program will not materially affect 1948 model production, but will benefit output of 1949 models.

AUTOMOTIVE INDUSTRIES Uses INS World Service

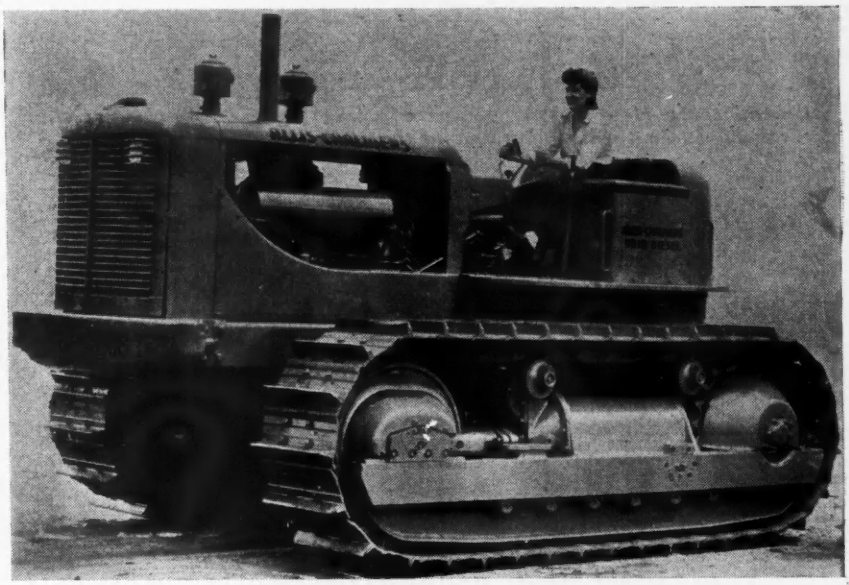
Supplementing an extensive and thorough national and international authoritative news coverage, the International News Service is now furnishing on-the-spot world-wide automotive news to AUTOMOTIVE INDUSTRIES. This new service makes available 8000 INS news correspondents all over the world, and continues AUTOMOTIVE INDUSTRIES' position as the leading automotive news authority.

With the country divided into three main areas—the East, mid-West, and Pacific—AUTOMOTIVE INDUSTRIES' effective national organization has key staffs located in New York, Philadelphia, Washington, Cleveland, Detroit, Chicago, and Los Angeles reporting the latest in the automotive industries. Internationally, "special to AUTOMOTIVE INDUSTRIES" is being dispatched from London by W. F. Bradley, who once again is covering western Europe, following a harrowing experience in a German concentration camp; from Vienna by Leo Vogel who covers the middle European picture, including Germany, Austria, and Czechoslovakia; and from Genoa, Italy, by Raffaele Sansone.

In addition to spot news, a primary function of the organization is supplying current surveys of industrial and trade conditions affecting the automotive field in each particular sector. Eminent specialists in the various industries comprising the automotive field, and special staff writers such as P. M. Heldt, Robert McLarren and others continue to write for AUTOMOTIVE INDUSTRIES.

Show New Playboy Model To Prospective Dealers

Playboy Motor Car Corp. of Buffalo has shown its first model to prospective distributors and dealers. The Playboy, a convertible coupe, is considerably smaller than the conventional lower priced car, weighs about two-thirds as much, and is expected to retail at about $1000 it is reported.



Allis-Chalmers' Giant Crawler

This giant Allis-Chalmers HD-19 Diesel crawler tractor, now in production, features a three stage hydraulic torque converter which has increased work capacity. This application of the liquid drive principle permits engine output to be held constantly near the maximum.

Packard Changeover Cost Four Times Normal Rate

The cost of the Packard changeover to 1948 models was about $21 million according to George Christopher, president. He said that the cost was from three and a half to four times that of any previous model change. Mr. Christopher revealed that the design for an automatic transmission has been set, but that it probably will take six to nine months to obtain required machinery and to get production going.

Used Car Dealers Group Urges Prestige Campaign

The nation's used car dealers through their official organization, the National Used Car Dealers Association, made plans during their recent convention at St. Louis for a campaign to raise their prestige with the public. The association has embarked on a campaign of safety and ethics aimed at winning public confidence. The association is seeking national legislation which will remove all unsafe cars and trucks from the highways; a national traffic code, licensing law and frequent examinations of licensed drivers; a national uniform titling law, similar to the one used currently in Texas and California; and cooperation of their own members in a free inspection campaign covering all functional parts of all cars to be offered between Oct. 1 and Nov. 1, to improve highway safety.

British Voice Protest Against Gasoline Ban

The reaction against the decision of the British Government to cut out all gasoline to private owners not engaged in essential work, effective Oct. 1, is taking the form of protests by trade associations and automobile clubs. The automobile dealers association claims that the measure will entail a loss of as high as 75 per cent in business to dealers, repair men and gasoline stations. The saving of $20 million, which is expected from the cut, will be infinitesimal compared with the loss of production, and the inconvenience caused when 800,000 automobiles are forced off the road. The Association of British Chambers of Commerce points out that as against the saving of $20 million by reduced gasoline purchases, there will be a loss of $660 million in lowered tax returns. The loss of profit by dealers, repair men and gasoline stations will result in smaller income taxes paid. Unless gasoline is issued to employes engaged in vital dollar-earning industries, there will be a loss in production. The difficulty of determining what is essential work is stressed by Sir Miles Thomas, president of the

New Truck Registrations*

July and seven months 1947 compared with 1946. Arranged by makes in descending order according to the seven months' 1947 totals.

MAKE	July 1947	June 1947	July 1946	SEVEN MONTHS Units 1947	Units 1946	Per Cent of Total 1947	Per Cent of Total 1946
Ford	17,735	17,485	5,313	120,577	59,611	23.89	20.94
Chevrolet	13,789	9,206	18,754	118,603	65,236	23.50	22.91
Dodge	11,608	10,709	8,686	76,192	53,961	15.10	18.95
International	9,858	8,929	7,767	64,071	38,548	12.69	13.54
G. M. C.	3,479	4,924	1,773	30,979	7,515	6.14	2.64
Willys	5,132	4,642	4,189	25,789	19,245	5.11	6.76
Studebaker	3,502	3,415	3,147	23,980	10,866	4.75	3.82
Reo	980	1,121	988	8,192	4,646	1.62	1.63
White	1,148	981	583	7,666	5,170	1.52	1.82
Diamond T	917	811	99	5,944	2,910	1.18	1.02
Mack	1,034	848	269	5,832	3,960	1.16	1.39
Federal	546	475	401	3,298	2,444	.65	.86
Autocar	386	342	459	2,802	2,456	.56	.86
Diro	414	433	305	2,768	2,064	.55	.72
Brockway	381	282	334	2,527	2,092	.50	.73
Hudson	160	304	235	1,977	1,436	.39	.50
F. W. D.	95	104	51	733	323	.14	.11
Sterling	76	49	34	364	310	.07	.11
Ward La France	42	40	.....	331	.....	.06	.....
Oshkosh	30	16	.....	150	.....	.03	.....
All Others	335	342	270	1,952	1,932	.39	.69
Totals	71,647	65,458	53,657	504,727	284,725	100.00	100.00

* Data from R. L. Polk & Co.

Society of Motor Manufacturers and Traders, who says that the essential user has not been and cannot be determined. There are many workers, particularly ex-service men, who are using their basic ration for going to work.

Elect Wm. H. Vallar Treasurer of Chilton

William H. Vallar was elected treasurer and George Maiswinkle assistant treasurer of the Chilton Co. at a recent meeting of the directors, Joseph S. Hildredth, president, announced. Succeeding the late William A. Barber, Mr. Vallar has been associated with Chilton for 41 years.

Pesco Products Builds New $120,000 Laboratory

Construction of a $120,000 laboratory in Bedford Township, near Cleveland, will start immediately according to plans recently announced by Pesco Products Div., Borg-Warner Corp. The new laboratory will be used to test aircraft fuel systems.

Ten Top Car & Truck Export Markets Shift

Latest statistics showing distribution of automobiles and trucks in the export market reveal that a shift in distribution has taken place since 1939, which is considered the last normal prewar year. According to figures for the first seven months of this year, the top ten foreign markets in order of numerical importance for U. S. cars are: Canada, Union of South Africa, Argentina, Brazil, Mexico, Belgium, Sweden, India, Netherlands and Venezuela. In 1939 the ten leading countries in order of volume were: Union of South Africa, Canada, Australia, Argentina, Sweden, Belgium, Brazil, Mexico, Colombia and British India. Trucks also show a shift in distribution. The 1947 figures show that the top ten U. S. truck importers in order are: Argentina, Brazil, Mexico, Venezuela, Canada, Belgium, Union of South Africa, India, Cuba and Colombia. In 1939 the order was: India, Belgium, Hongkong, Union of South Africa, Brazil, Sweden, Argentina, Venezuela, China and Spain. Obviously the Western Hemisphere markets have gained in importance while those of Europe and Asia have declined.

Black Market Operating In Tractors & Implements

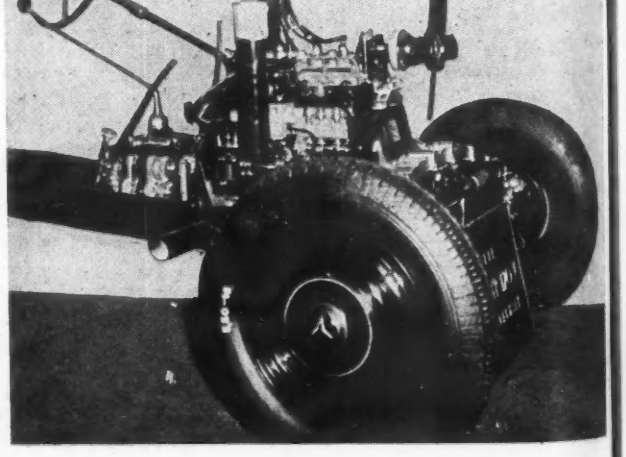
Automobile manufacturers and dealers are not the only ones having trouble with black market operations in their products. According to Merrit D. Hill, general sales manager of Dearborn Motors Corp., "There has been and still is a terrific amount of black market selling of tractors and implements. New tractor and farm implement sales are being watched for black market operators. New owners are approached and offered higher prices than they paid for the equipment and some are induced to resell it at a profit. Therefore, it can be assumed that certain farmers who are getting delivery of new tractors and implements do not need them as certain other farmers." Mr. Hill has urged Ford tractor and Dearborn equipment dealers to make certain that equipment is sold and delivered only to those farmers who are known to have a great need for them.

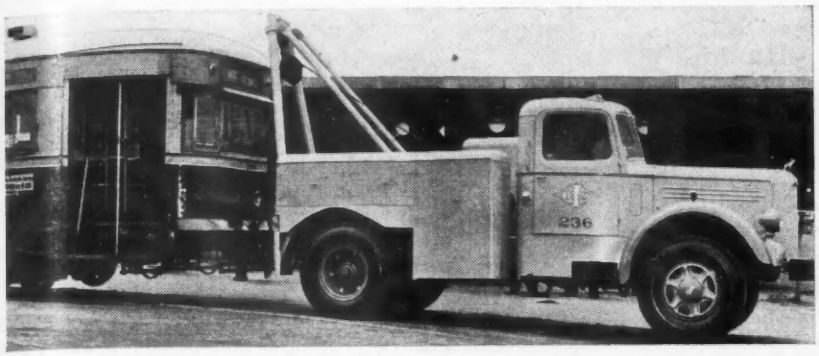
Sell Lagonda Plant

Reaching an agreement recently, Lagonda, Ltd., will sell its plant and machinery at Staines, England, to a group headed by A. P. Good. Lagonda production had been suspended, and recently the facilities have been used to produce various

Latest Mercedes-Benz

A highlight of the 1947 Export Fair in Hanover, Germany was the engine and chassis of the latest Mercedes-Benz shown here. Acme photo.





When the Trolley Car Breaks Down

Especially equipped and furnishing enough power to raise and move a 35,000 lb car, this Mack Truck wrecker is being used by the Indianapolis Railways for street cars that are out of commission. The wrecker is fitted with a special body, a winch, and a boom designed for this operation.

engineering products. This will continue; however, a new line of Diesel engines will be the principal products made.

David Brown, owner of Aston Martin, Ltd., however, has purchased Lagonda drawings, tools, and spares from A. P. Good, and he plans to continue production of the Bentley-designed 2½ litre Lagonda in a plant near Staines. It is felt that this design is especially good for the export market, particularly in the U. S. A.

Gas Turbine Propels British Navy Gun Boat

A marine gas turbine, developed by the Metropolitan Vickers Electrical Co., Ltd., England, has been installed in a Royal Navy motor gun boat. It drives the central propeller shaft of the craft, and takes the place of one of the three 1250 hp gasoline engines. It is reported that preliminary tests of this experimental installation are proceeding satisfactorily.

Republic Stops Seabee Production

Production of the Seabee, amphibian personal plane, has been discontinued, it was recently disclosed by the Republic Aviation Corp. However, the company announced that it would provide spare parts and service for planes already sold.

Cripps Sets Car and Truck Export Targets for England

Export targets set by Sir Stafford Cripps for passenger cars are $20 million a month for the first stage, rising to $25.6 million a month by the end of 1948, compared with a level of $10.4 million for the last quarter of 1946. For trucks the target is $12.5 million a month for the first stage, rising to $16 million, compared with $8.6 million for the last quarter of 1946. The Society of Motor Manufacturers and Traders, commenting on this, says "Targets are impossible. They mean export 20,500 cars a month by June; 26,300 a month by December 1948, which is more than present total production, now running at 25,000 monthly. Truck target means 58 per cent output to export in the first stage; 75 per cent by December 1948." Under the Cripps plan there is a fear that several manufacturers whose models are not particularly suitable for export will be forced out of business. It is estimated that six firms are in this position.

Young Radiator Celebrates Twentieth Anniversary

The Young Radiator Co., Racine, Wisc., recently commemorated the twentieth anniversary of the founding of the firm in 1927 by Fred M. Young, president of the company. Manufacturing a wide variety of heating, cooling and air conditioning products, Young products vary from a tiny core for hot water car heaters to a 17 ft high vertical air discharge unit which dissipates up to 15 million Btu's per hr from steam, gas, etc., in the oil fields.

IHC to Spend $5 Million For West Pullman Works

The International Harvester Co. has announced a $5 million modernization program for its West Pullman, Ill., works. The West Pullman plant makes carburetors, magnetos, anti-friction bearings, steel chains and other parts used in the company's trucks, tractors, and farm machinery.

New Passenger Car Registrations*

Arranged by Makers in Descending Order According to the 1947 Seven Months' Totals.

MAKE	July 1947	June 1947	July 1946	Seven Months Units 1947	Seven Months Units 1946	Seven Months Per Cent of Total 1947	Seven Months Per Cent of Total 1946
Chevrolet	59,676	59,661	30,805	375,962	86,201	20.90	12.94
Ford	39,479	44,735	24,893	295,119	132,816	16.41	19.93
Plymouth	23,120	25,658	23,821	179,353	98,466	9.97	14.78
Buick	19,935	20,352	11,866	134,779	29,362	7.50	4.41
Pontiac	18,390	18,201	10,543	120,544	31,803	6.70	4.77
Dodge	16,793	16,867	15,872	115,223	64,295	6.41	9.65
Oldsmobile	15,212	14,897	8,647	105,291	24,689	5.86	3.71
Nash	7,508	8,505	8,233	62,215	41,057	3.46	6.16
Mercury	7,694	8,454	4,228	62,056	20,525	3.45	3.08
Studebaker	8,715	8,658	5,684	59,700	20,845	3.32	3.13
Hudson	9,038	8,670	7,904	59,096	33,485	3.29	5.02
Chrysler	7,396	7,419	7,799	52,314	31,195	2.91	4.68
De Soto	5,632	5,549	5,813	40,021	28,287	2.23	4.25
Cadillac	4,690	4,665	1,592	30,196	6,768	1.68	1.02
Packard	3,807	3,526	4,679	25,010	12,977	1.39	1.95
Kaiser	4,137	3,337	.....	22,750	.....	1.27	.....
Frazer	5,984	5,003	.....	21,119	.....	1.17	.....
Lincoln	2,235	2,272	652	14,492	3,158	.81	.47
Willys	2,298	2,049	.....	13,598	.....	.76	.....
Crosley	1,356	1,319	76	8,784	90	.49	.01
All Others	72	66	54	463	241	.02	.04
Totals	263,167	269,863	172,961	1,798,085	666,260	100.00	100.00

* Data from R. L. Polk & Co.

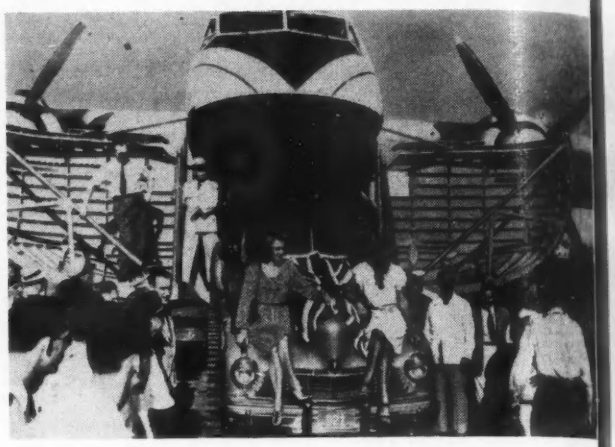
NEWS of the AUTOMOTIVE INDUSTRIES

Start Work on GM's Cent'l Foundry, Defiance, O.

Excavation work has started on the new 750 by 350 ft gray iron foundry of the Central Foundry Div., General Motors Corp., on a 256-acre site east of Defiance, O. Structural work is expected to start in the immediate future according to Robert S. Spence, superintendent for the general contractors, Spence Bros., Saginaw, Mich. An approximately 100 by 100 ft two-story office building will be erected in front of the huge plant building, with occupancy expected within three months.

Havana Hudsons

Received with wild acclaim upon their arrival in Cuba, new Hudsons are being flown regularly from the United States in large cargo planes. Distribuidora Automotriz, S.A., Hudson Motor Car Co. distributor in Havana, is the fortunate consignee.



MEMA Elects Directors

The following were recently made members of the board of directors of the Motor and Equipment Manufacturers Association: J. W. Anderson, The Anderson Co., Gary, Ind.; G. H. Goehrig, Blackhawk Manufacturing Co., Milwaukee, Wisc.; C. O. Kleinsmith, National Carbon Co., New York, N. Y.; C. J. Schuepbach, Sunnen Products Co., St. Louis, Mo.; F. G. Wacker, Ammco Tools Inc., N. Chicago, Ill. Messrs. Anderson, Goehrig, Kleinsmith and Schuepbach were elected for the term of 1948-1949-1950, and Mr. Wacker for the 1948 term.

Benson Ford in High Lincoln-Mercury Post

Benson Ford, son of the late Edsel Ford and brother of the present president of the Ford Motor Co., will serve in an executive capacity under T. W. Skinner, general manager of the Lincoln-Mercury Div. The Lincoln-Mercury unit is becoming an increasingly important part of the Ford enterprise, with expansion plans calling for three new plants at Metuchen, N. J.; St. Louis, Mo.; and Los Angeles, Calif.

Harrison W. Flickinger

Harrison W. Flickinger, vice president of Republic Aviation Corp., Farmingdale, L. I., and a Lieutenant Colonel (ret.), U. S. Army Air Corps, died on Oct. 5 following a brief illness.

Ford of Canada Increases Prices of Cars and Trucks

To compensate for higher labor and material costs, Ford Motor Co. of Canada, Ltd., has increased prices on Ford, Mercury, and Monarch passenger cars, and on Ford and Mercury trucks. Increases listed are: heavy trucks, two to three per cent; light trucks, three to five per cent; panel trucks, five to ten per cent; and passenger cars, six to ten per cent. Dollarwise, increases range from $74 on the Mercury truck to $232 on the Monarch car.

Elect Wm. Allen Chairman Of Western Aircraft Group

William M. Allen, president, Boeing Aircraft Co., Seattle, Wash., has been elected chairman of the Western Region Aircraft Manufacturers Council of the Aircraft Industries Association, succeeding T. Claude Ryan, president, Ryan Aeronautical Co., San Diego, Cal. New vice-chairman of the Western Region Aircraft Manufacturers Council is Richard W. Millar, chairman of the board, Northrop Aircraft, Inc., Hawthorne, Cal., succeeding Mr. Allen, newly-elected chairman.

Austin Orders in U.S. & Canada Nearly $30 Million

Austin Motor Co. has already sold nearly 8000 cars within a radius of 100 miles of New York City, and has orders totaling between $25 and $30 million in the United States and Canada, according to Leonard P. Lord, chairman. The company expects to ship 500 of its cars to this

Shipments of Complete Aircraft and Aircraft Engines and Other Products of Their Plants, 1947*

AIRCRAFT

	July	Seven Months
Complete Aircraft	1,102	12,529
For U. S. Military:		
Number of Planes	104	789
Value of Planes and Parts	$27,748,095	$278,111,520
For Other Than U. S. Military:		
Number of Planes	998	11,740
Value	$11,918,019	$100,453,693
Value of Parts	$ 1,920,023	$ 11,473,929
Conversions:		
Number of Planes	10	141
Value	$ 585,026	$ 12,384,657
All Other Products, Value	$ 2,706,695	$ 19,319,483
Total Value of Products	$44,877,858	$421,743,282

AIRCRAFT ENGINES

	July	Seven Months
For U. S. Military:		
Number	338	2,682
Value	$11,433,886	$113,276,504
Value of Parts	$ 4,653,236	$ 21,030,650
For Other Than U. S. Military:		
Number	971	12,968
Value	$ 2,972,269	$ 36,707,336
Value of Parts	$ 2,285,376	$ 20,132,904
Totals—Engines:		
Number	1,357	15,650
Value	$14,406,155	$149,983,840
Value of Parts	$ 6,938,612	$ 41,163,754
All Other Products, Value	$ 184,091	$ 3,107,157
Total Value, Engines and Parts	$21,528,858	$194,254,751

* Bureau of the Census and Civil Aeronautics Administration.

country in October, and hopes to be shipping up to 500 a week here by the end of this year.

Test Small Car For Australian People

An Australian people's car, the Wiles-Thomson, which the producer hopes to price tag under $950, has recently finished its preliminary tests. Powered by a 7.2 hp twin-cyl, two-stroke water-cooled engine the car is a light two-seater with a maximum speed of 50 mph. The Wiles Mfg. Co., of Adelaide together with J. M. Thomson, the model's original designer, built the car. A new company will be formed to make the cars on a mass production basis if the final tests are satisfactory.

Labor

Top UAW-CIO Officers in Bitter Political Fight

With politics at white heat in the top brackets of the UAW-CIO, factionalism is creating an uproar in union headquarters at Detroit. The fight broke out when Walter Reuther, UAW president, blasted his opponents in the union's newspaper charging that funds were being squandered and that no effort was being made to keep Communists out of important union offices. The opposition retaliated by forcing a censure vote through the executive board, and also by capturing control of committees at the next convention. However, Mr. Reuther scored by winning nine out of ten convention delegates in an election at the Motor Building Unit of Ford Local 600. In another election at De Soto Local 227, home unit of UAW vice president Richard Leonard, Mr. Reuther won a clean sweep of delegates when all four of his supporters were elected.

FAA President Declines to Run

Robert H. Keys, president of the Foreman's Association of America since it was founded, declined to run for reelection and has been succeeded by Carl Brown, who was elected at the annual FAA convention in Detroit. Although Mr. Keys announced that he wished to devote his energy to his campaign for election to the Detroit Common Council, observers believe that the action was motivated by the heavy blows the FAA has suffered during the past year. The organization is no longer considered to have much power in labor circles since its resounding defeat in the Ford strike and the advent of the Taft-Hartley law which does not require employers to recognize unions of supervisory personnel.

Ford Workers Veto Pension In Favor of Wage Increase

The UAW-CIO pension drive at the Ford Motor Co. failed miserably when workers overwhelmingly defeated the pension plan in favor of an alternative proposition of 11½ cents an hour pay increase, plus six paid holidays. Consequently, Ford workers' hourly rate stands at $1.52, nine cents above that of General Motors and seven cents higher than the industry average. Failure of the pension plan to carry dealt a heavy blow to one of the pet projects of union leaders. Essentially, it was a vote of younger employes against those of older men. The union will have a much more difficult task in getting any other company to consider any such proposal. Walter Reuther, UAW president, recently asked General Motors to undertake discussions on a pension plan, but it is felt now that he will have very little chance of success.

Workers at the Ford Motor Co. of Canada have rejected a pension proposal offered by the company. Instead, the union is seeking a straight general increase expected to amount to about 12 cents an hour.

Metals

Copper

Preliminary reports indicate that November demand will either equal or exceed October demand, when copper was largely sold out by the beginning of October. As might be expected, in the domestic copper market current prices are firm. Wire mill orders continue at top levels, and some improvement has been noted in brass mill demand; however, the foreign copper market is still poor.

Lead

Following the summer decline, demand for lead has constantly increased. Already, demand for October lead deliveries has exceeded that for September, and strong demand for lead in the foreign market is reported. For the present, producers indicate that the current price schedule will hold.

Zinc

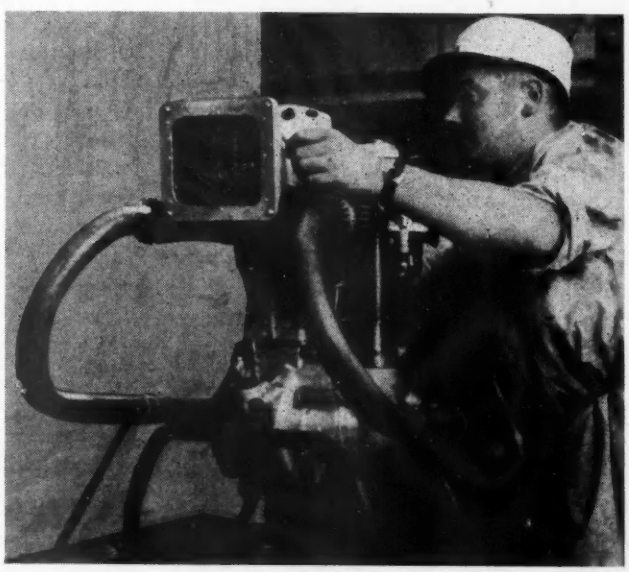
Improvement in demand for all grades of zinc has been reported by producers. Prime Western is available readily, but Special High Grade is in comparatively short supply.

Cadmium

Producers are expected to maintain the present price of $1.75 a lb. Most consumers are able to get what they need, and the market is easy.

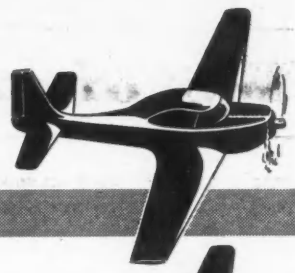
(*Turn to page* 94, *please*)

No Valves

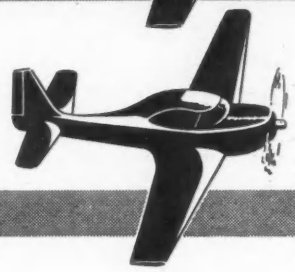


This small engine, which operates without valves, was recently exhibited. It is claimed to give 1.05 hp per cu in. of displacement at a speed of 8000 rpm. The photo also shows its inventor, an officer in the French Foreign Legion. European Picture Service photo.

SOURCE: BRAZILIAN MINISTRY OF AERONAUTICS



BRAZILIAN DESIGN AND MANUFACTURE 354



U. S. DESIGN AND MANUFACTURE 346

OTHERS 44

Personal aircraft registered in Brazil at the end of 1946

Latin America's Growing Aircraft

OUR good neighbors in Latin America are rapidly building a healthy aircraft industry. In fact, some observers are predicting that if the industrialization now centered in Argentina and Brazil continues at its present rate of growth for another decade, these countries will not only be supplying the major portion of their personal aircraft needs, but they may well be establishing a profitable export business in this field.

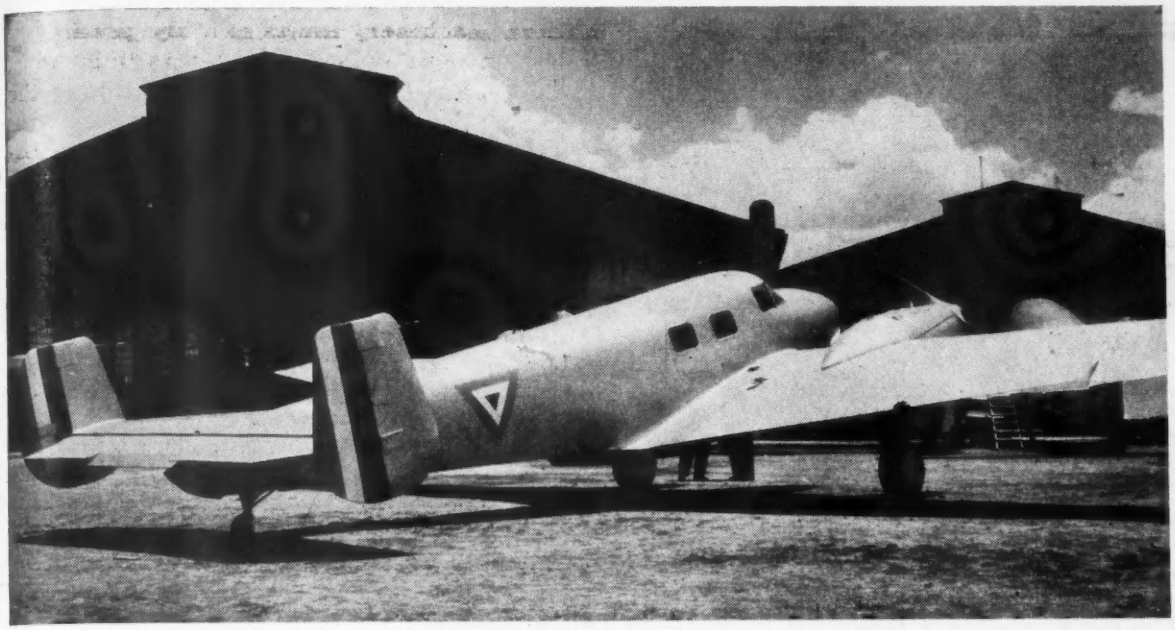
Brazil's Aircraft Factories

The Brazilian aircraft industry is presently centered in five small factories—all well staffed with progressive Brazilian engineers. The most important plant was erected at Galeao by the Air Ministry, and for the last 10 years has been the chief source of trainers for the Brazilian air force. German designs were originally produced here, but during the war a license to build Fairchild PT-19's was obtained. Assembly line techniques were introduced with the help of American engineers, and airframe production is now exceeding 1½ units per day. Engines, instruments, tubing, hydraulic fittings and brakes are imported from the States.

The first trainer to be wholly designed at the factory is also being test flown. Present plans call for the wooden monocoque structure to be broken down into 13 major components for easy maintenance and assembly. Interchangeability is also being emphasized for the first time to eliminate costly repair delays in the field. Some notable research work has gone into this design, particularly in the use of native woods and resins, and modern test facilities have been provided for this purpose.

The largest private firm in Brazil is the Cia. Aeronautica Paulista, organized at Sao Paulo in 1942. Standard product is based on the Piper Cub design, modified to afford greater range and lower landing speed. Here again, unusual effort has been directed toward easing the repair problem at poorly equipped fields. Control cable brackets have been largely standardized in design, for example, and bracket attach holes are all drilled from a master gage to assure maximum interchangeability. Steel tubing has also been limited to three basic sizes with little increase in overall weight.

Over 400 of these planes have already been produced, and substantial numbers are being exported to Argentina and Chile. In addition, the Paulista company is starting production on a new four-place Carioca design, utilizing the same wing and tail surfaces as on the smaller plane, but adding a larger



Light transport in production at the Mexican national aircraft factory

By George M. Galster

Industry

This is the CAP-4 produced by the Cia. Aeronautica Paulista in Sao Paulo

fuselage and engine to the design.

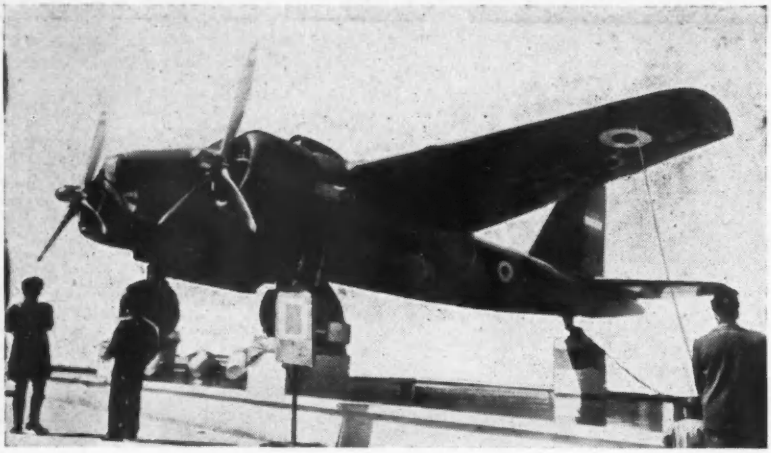
Another popular Brazilian lightplane is produced in Rio by the Cia. Nacional de Navegacao Aerea. This is a sturdy all-wood design using plywood covered rib and stringer construction. During the war, this company developed bonded two-piece wooden tubing with a surprisingly good strength-weight ratio. Because of its low cost and greater availability, this innovation is still being used in current production. The company has also been experimenting with two and three-engine feeder-line designs. The former prototype, now undergoing test, employs an ordinary welded-tube fuselage and fabric covered wooden wing.

During the war, Brazil began an ambitious program to build complete North American AT-6 trainers. Two new plans were erected for this purpose, one at Belo Horizonte to build the airframes, and the other near Rio to produce Wright engines of 450 hp. Only limited production was attained at these plants before the war ended, however, and the Belo Horizonte operations were recently taken over by the Paulista company. It is now reported that the Carioca series will be produced here.

The engine plant is still managed by the Air Ministry, and most facilities are being completed. Rough castings and forgings will continue to be shipped here from the United States, however, until Brazil's new steel mill at Volta Redonda is in full operation. A section of the engine plant is also handling major overhauls for several Brazilian airlines.

Developments in Argentina

Aircraft production in Argentina is extensive, but it is still chiefly military in nature. The factory at Cordoba, referred to as the Instituto Aerotecnico, has been steadily expanded from a modest beginning in 1927. Assembly line techniques are now employed in all phases of production, and equipment includes modern jigs and fixtures, power-operated hand tools, and heavy presses of German design. The plant has a large foundry, a wood testing laboratory, a chemical and metallurgical section, a plastics division, and a wind tunnel using models up to 40 in. wing span. A large flying field adjoins the factory, and a new housing project for the 3000 employes has just been completed nearby. In addition to turning out wood and metal propellers, pumps, instruments, and carburetors, the



Argentine-designed attack bomber DL-24

plant is producing three types of engines: a Pratt and Whitney design of 620 hp, an Argentine design of 450 hp called El Gaucho, and a German Bramo of 140 hp.

No figures are available as to the actual number of aircraft produced here, but those made under foreign license in the past have included the Avro Gosport, the Focke-Wulf FW-44J, and the Curtiss P-36. Light trainers of Argentine design were first constructed in 1932, and the latest of this series is the well known El Boyero. In 1944, the DL-22 design was started; this plane is similar in appearance to the North American AT-6. It is powered with the Gaucho engine, has all-wood construction, and is equipped with double-slotted flaps and a retractable landing gear. It is classified as an advanced trainer, but is supplied to the airforce with bomb racks, two wing guns, and one ring-mounted gun. Air forces of Chile, Peru and Brazil each received a gift of one of these ships recently and export sales are planned. The factory is also producing an excellent attack bomber designated the DL-24 Calquin, a copy of the British Mosquito with radial engines. Several CG-4 type cargo gliders were also constructed last year, and now jet propulsion experiments are under way.

Army Trainers Coming from Mexican Plant

Mexico was the first country in Latin America to manufacture aircraft and aircraft engines, erecting a factory for this purpose in 1915. A few twin-row rotary engines were actually built in 1918, but all efforts since then have been directed toward airframe construction. The plant is now turning out three types of all-wood army trainers plus a light twin-engined transport, all designed for high-altitude performance. Mexican materials are utilized throughout with the exception of the engines, carburetors, instruments and tires. Present employment is over 300, but the lack of modern machinery limits monthly production to two or three planes of each type. Colonel Angel S. Calvo, in charge of the plant, recently stated that plans for a completely new factory are waiting congressional approval.

Peruvian Airline Builds Transport

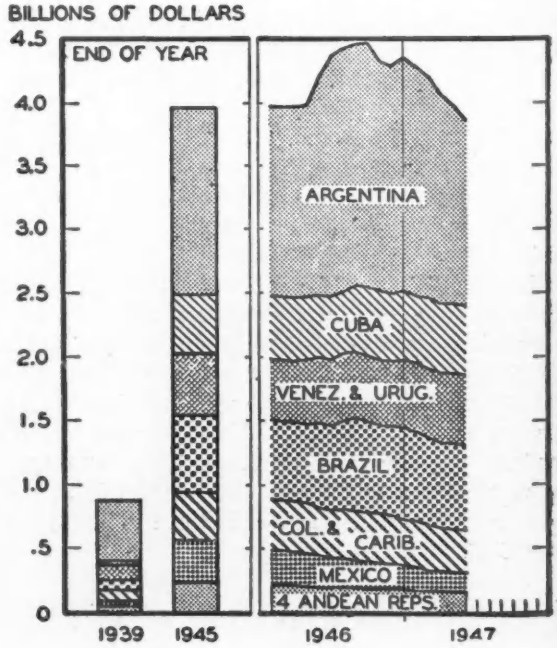
The Peruvian government also built an aircraft factory in 1937 with the help of the Italian Caproni company. Production was sporadic until 1941 when the Italians were ousted and native engineers took over. A series of trainers were then constructed for the air force, but the 800 employes are now engaged chiefly in maintenance and development work. Recent additions to the buildings and the placing of new machinery give weight to reports that production will be resumed on a Peruvian light plane design. Plant capacity is estimated at 30 planes per month.

The Peruvian airline, Compañía de Aviación Faucett, S.A., must also be mentioned since it has been producing transports for its own use for the last 14 years. Not more than six or seven are turned out each year, but the planes have proven extremely useful for operating into tiny jungle airports. The Faucett transport was originally a modification of the old Stinson Detroiter design, but the newest models have very little evidence of this lineage, incorporating retractable landing gear and an original airfoil section. Engines, propellers, and tires are imported from the United States and England.

Chile assembled a few military airplanes back in 1929 from parts supplied by the Curtiss-Wright Corp.,

(*Turn to page* 62, *please*)

Latin American Gold and Foreign Exchange Assets



Although Western Europe is the largest market, Latin America is the biggest cash paying customer of the United States, according to The National City Bank of New York. Latin American countries accumulated gold and foreign assets during the war, as shown by the above NCBNY chart, and now are using them, together with the proceeds of current exports, to pay for American goods on a big scale. Currently about two-thirds of Latin America's imports come from the United States as compared to one-third before the war and recently U. S. exports to Latin America are at the abnormal annual rate of $4 billion, the National City Bank states

Reo Introduces Flying Cloud Bus

A NEW Flying Cloud transit bus, now being introduced by Reo Motors, Inc., features lightweight construction, an underfloor engine mounting and high visibility for driver and passengers. Shown in the above photo, it has a wheelbase of 186 in., and with two doors can carry 37 passengers. With a single door, passenger carrying capacity is increased to 40 persons. General specifications of this new Flying Cloud bus, including details of its six-cylinder overhead-valve engine of 427 cu in. displacement, are given in the accompanying table.

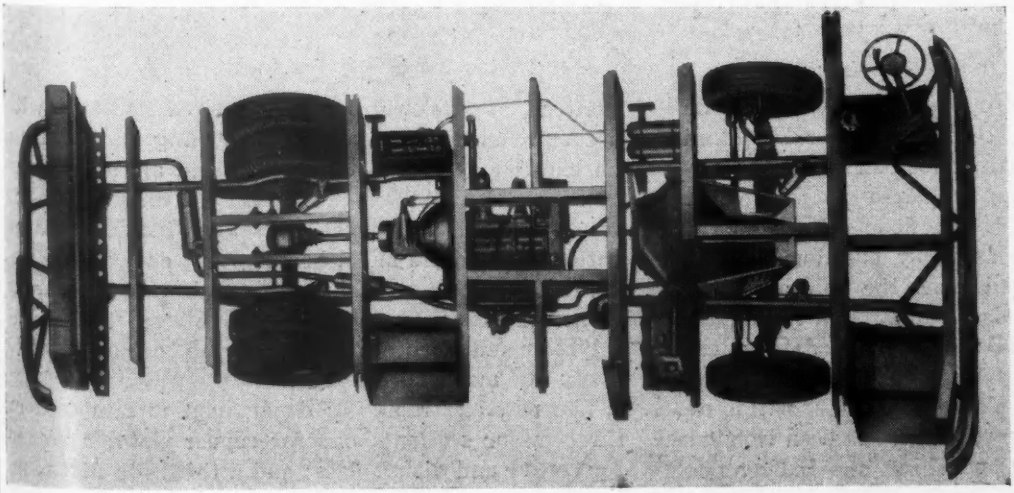
General body construction is aluminum with steel reinforcing. Underfloor cross members are a deep steel section attached to 3½-in. diam steel tubes running longitudinally in the spring hangar area on front and rear axles. These tubes not only strengthen the overall chassis, but also absorb any impact or shock taken through the bumpers. All underfloor cross members are attached to vertical side carlines, constructed of steel, which extend in a single piece from the center of the roof to the skirt, thus eliminating the usual bolted joint in the belt line.

Additional reinforcement in the body is obtained by extending the longitudinal steel and aluminum sections nearly the entire length of the vehicle. The roof is reinforced by five and the lower sides by six of these sections which are all one piece, except where interrupted on the lower sides by wheelhouse or doors. For additional strength in the high stress area of the side windows, Reo engineers have incorporated a unique patch design which features a rounded or gusset corner in sash panels. Aircraft type semi-flush riveting is used on the exterior of the coach, and all wheelhouses are single-piece construction with round

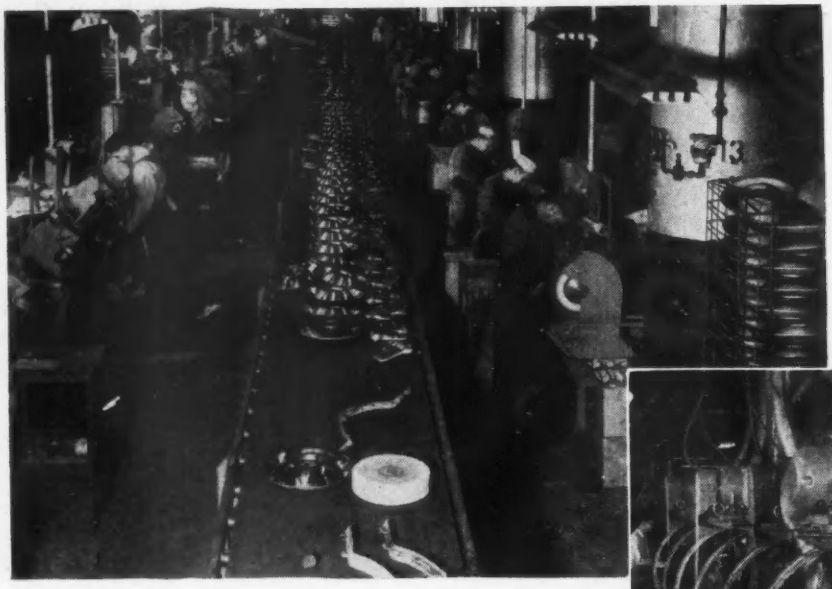
(*Turn to page* 86, *please*)

Specifications of Flying Cloud Bus

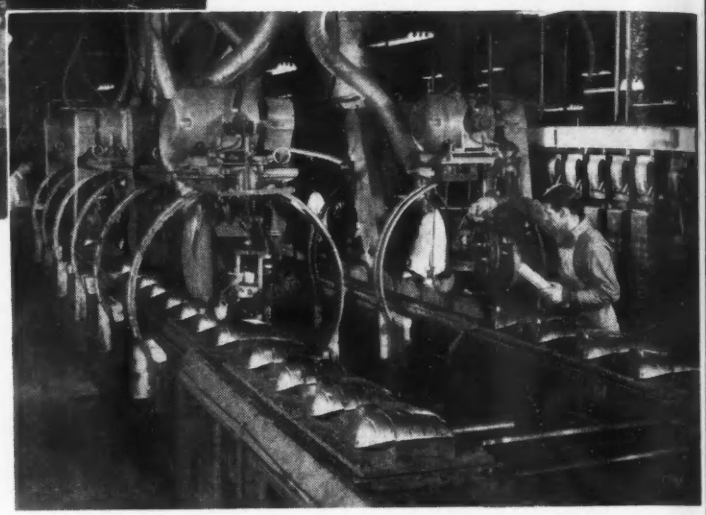
Engine	Six-cyl., overhead valve
Maximum torque	340 lb-ft at 1450 rpm
Maximum power	163 bhp at 3000 rpm
Displacement	427 cu in.
Clutch	14-in. heavy-duty single-plate
Transmission	Spicer three-speed syncro-mesh. Ratios: low, 3.80 to 1; second, 1.91 to 1; direct reverse, 4.24 to 1. Spicer model 916 torque converter optional
Rear axle	Full floating, hypoid bevel gear and pinion, Timken H-100
Front axle	I-beam reverse Elliott—Timken 36000 series
Springs	Length 62 in. front, 64 in. rear, with 4 in. width. Variable rated with direct-acting shock absorber both front and rear
Steering gear	Ross TA-71, cam and twin lever with 22-in. diam steering wheel
Service brakes	Full air, 12 cu ft, two cylinder compressor
Emergency brakes	12 by 4 internal expanding
Fuel system	80 gal tank, Dual electric pumps. Vent alarm standard. Drum-type oil-bath air cleaner.
Wheelbase	186 in.
Overall length	373 7/16 in.
Overall width	96 in.
Overall height	114 in.
Weight (ready for road)	13,000 lb



Pictured here is the chassis of the new Flying Cloud bus. The engine is mounted in the center of the frame, thus eliminating need for offset differentials, angle drives or transfer cases.



(Below) Close-up of the new straight line buffing machine recently installed in Cadillac's electroplating department for automatic buffing of stainless steel and copper-plated parts



(Above) First section of Cadillac's new polishing room with belt conveyor in center. This belt carries raw die castings and stampings, and copper-plated parts between the rows of grinders and polishers for snagging, polishing, and buffing. Worn polishing wheels also travel on the belt to the maintenance room

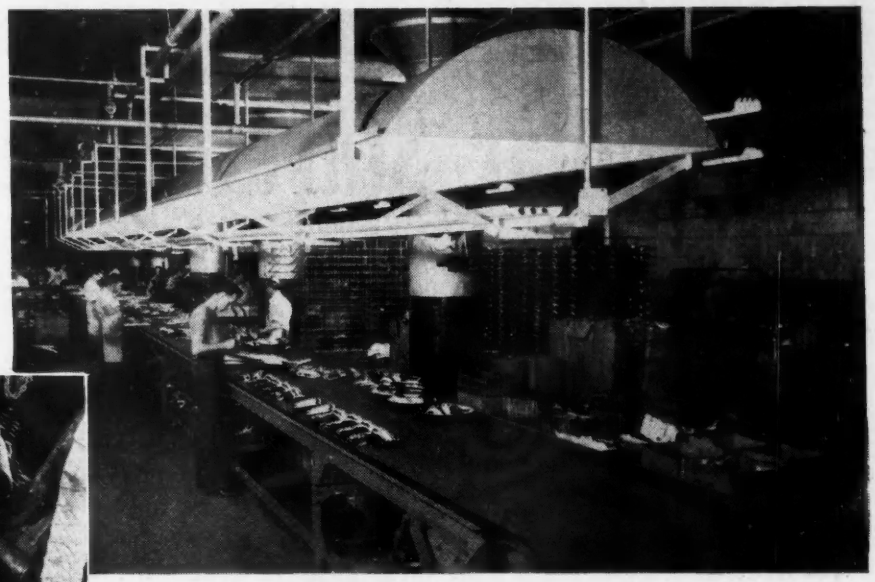
Cadillac Reorganizes Electroplating Dept. *for Greater Efficiency*

By Joseph Geschelin

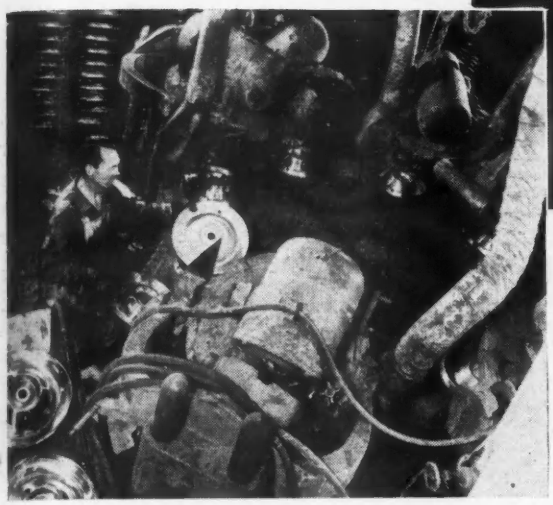
THE newly-located electroplating department of the Cadillac Motor Car Division, General Motors Corp., has been organized for efficient and high-quality production of chromium-plated external parts. Formerly housed on the fourth floor of a building across the street from the assembly building, the department has been relocated along the final assembly line, thus reducing materials handling to a minimum.

Since the plating room had to be accommodated within an existing structure, some interesting tricks of plant engineering were employed in the disposition of its elements. The plating room, which has been isolated from the related grinding, polishing and buffing operations, is enveloped by a pressurized enclosure with a comprehensive system of air cleaning and filtering, an exhaust system to draw off waste air and fumes, and an external blower system for delivering fresh air into the room. The fresh air system includes a large battery of blowers and a heating unit designed to elevate the temperature of incoming air to 65 F during winter months. Communications between the polishing room and plating room is by means of an extensive system of monorail conveyors.

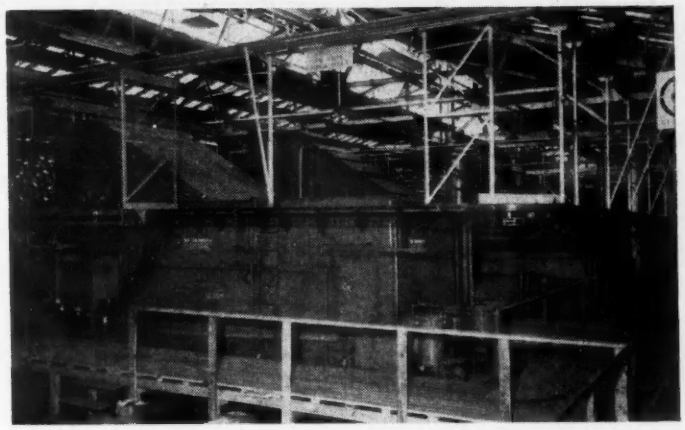
The new electroplating department is composed of three major sections: one for copper plate; a second for copper and nickel plate; and a third for chromium



(Right) This belt conveyor is used for final inspection of plated parts. Loaded in the background parts move under the reflecting canopy overhead and are visually examined by trained operators.



(Above) Looking down on the rotary buffing machine designed for automatic buffing of copper-plated wheel trim discs



(Right) Installation of two enormous trichlorethylene vapor degreasers in plating room. Parts from the first and second section polishing rooms are routed to these machines on the overhead conveyor

plate. Each of these is self-contained as to coordination of polishing and plating functions. They handle steel parts, zinc die castings, and certain parts of stainless steel which take a chromium coating for finish.

Starting at the first section, the various parts are handled on a long wide-belt conveyor for initial snagging, polishing and buffing. The parts are picked off the conveyor by operators for these machine operations. This belt serves another important function. At its terminal end is a department for reconditioning polishing wheels. As the operators replace worn wheels, they drop the worn wheel on the belt, these being deposited automatically in a bin in the reconditioning room.

Following initial preparation of the base metal, the parts are transported into the copper plating room for degreasing in two enormous degreasers, then are processed through the plating system. The first copper plate takes a cycle of 39 minutes. A feature of this department is a series of supplementary hand plating tanks for handling service and special items as well as production overflow. Another feature is a system of stand-by reserve tanks used for transferring solutions from the plating tanks whenever purifying is required. The transfer of solutions is made rapidly and automatically.

Following copper plating, the parts are returned to the first section for buffing. To handle the polishing and buffing of base metal and copper plate, Cadillac has installed automatic equipment of various kinds, such as rotary buffing machines for wheel trim discs, a merry-go-round conveyor with automatic buffing heads for bumper guards, and a straight type buffing machine for long straight parts of steel and stainless steel. One of these rotary buffing machines is operating experimentally with liquid Tripoli, as contrasted with the usual application of Tripoli in solid form. The liquid is sprayed at intervals by means of a spray gun at each wheel.

After polishing, the parts go through the copper and nickel section for bright nickel plating. After plating

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Caterpillar Starts Production of New Engine, Tractor

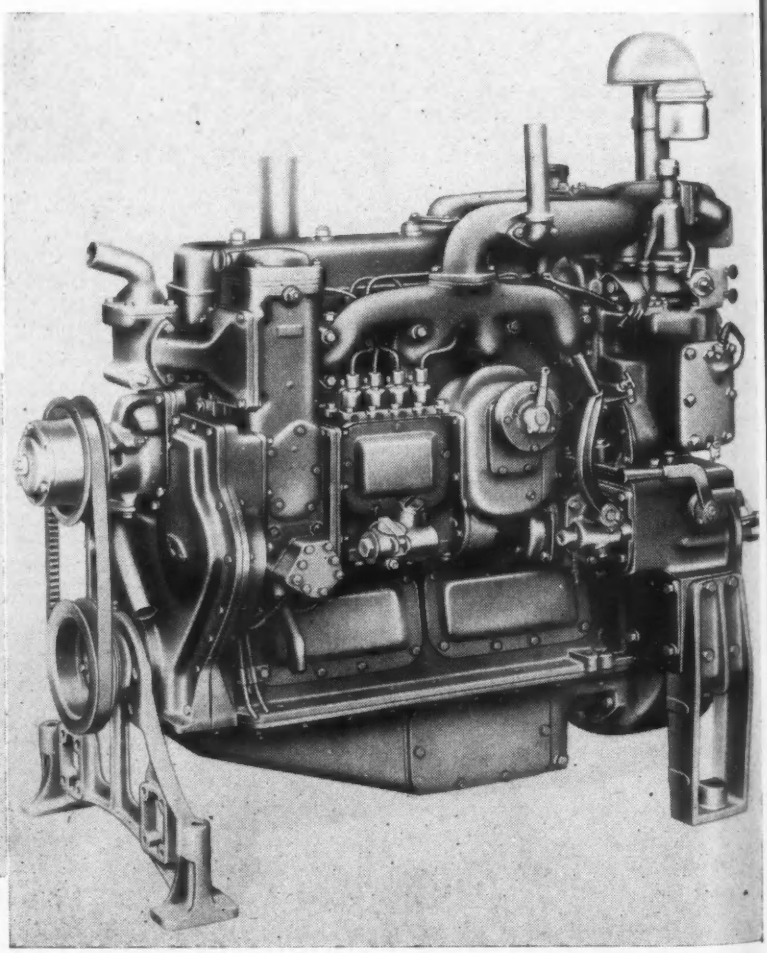
Specifications of Caterpillar D311 Engine

Type	Four-cyl four-stroke Diesel
Bore	Four in.
Stroke	Five in.
Displacement	252 cu in.
Compression ratio	19.5 to 1
Number main bearings	Five
Fuel injection system	Gear-type transfer pump absorbent filters, individual fuel-injection pumps, single orifice fuel-injection valves. Caterpillar built system.
Cooling system	Belt-driven centrifugal-type circulating pump.
Starting system	Two-cyl horizontal four-stroke gasoline engine with 3⅛ in. bore, 3½ in. stroke, 15 hp at 3000 rpm. Electric starting or dual engine and electric starting is available.
Governor	Flyball, spring-balanced type Caterpillar built.
Cylinder liners	Removable wet type. Hi-Electro hardened alloy cast iron.
Cylinder head	Alloy cast iron with removable precombustion chambers.
Valves	In-head type of special alloy steel.
Length	59⅛ in.
Height	41 7/32 in.
Weight Shipping (approx.)	1915 lb

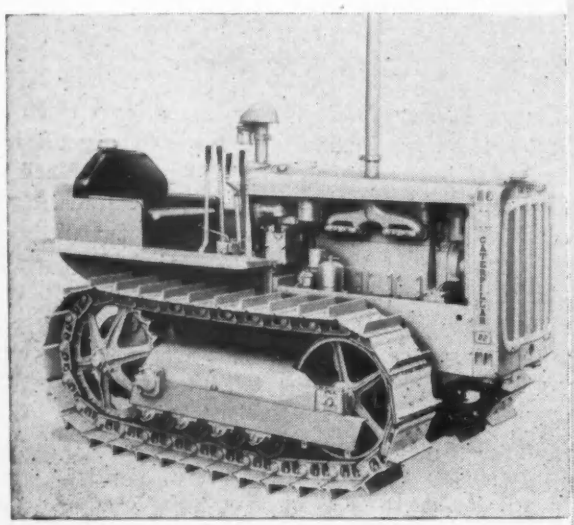
A NEW four-cylinder Diesel engine, a new Diesel track-type tractor and a Diesel motor grader powered by it have been placed in production by the Caterpillar Tractor Co., Peoria, Ill. These new products are the Diesel D311 engine, the D2 tractor and the No. 212 motor grader.

The D311 engine, which powers the tractor, replaces the D3400 in the Caterpillar line, and is available as an industrial power unit, an electric set and a marine engine. It develops a maximum output, with radiator fan and full equipment, of 49 hp at 1700 rpm. The D2 tractor has 32 drawbar hp and 38 belt hp, a 24 per cent increase in power over the predecessor model. The new motor grader at 45 hp shows a 29 per cent increase in

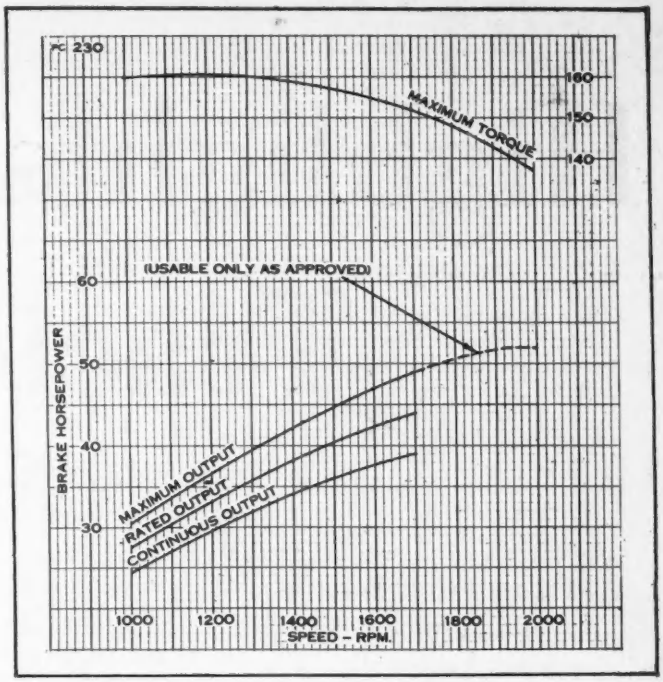
(Right) The new Caterpillar D311 four-cylinder Diesel engine.



(Below) Caterpillar D2 Diesel tractor. Overall length is 107⅝ in., ground clearance is nine in., and shipping weight 6710 lb (approx).



and Grader

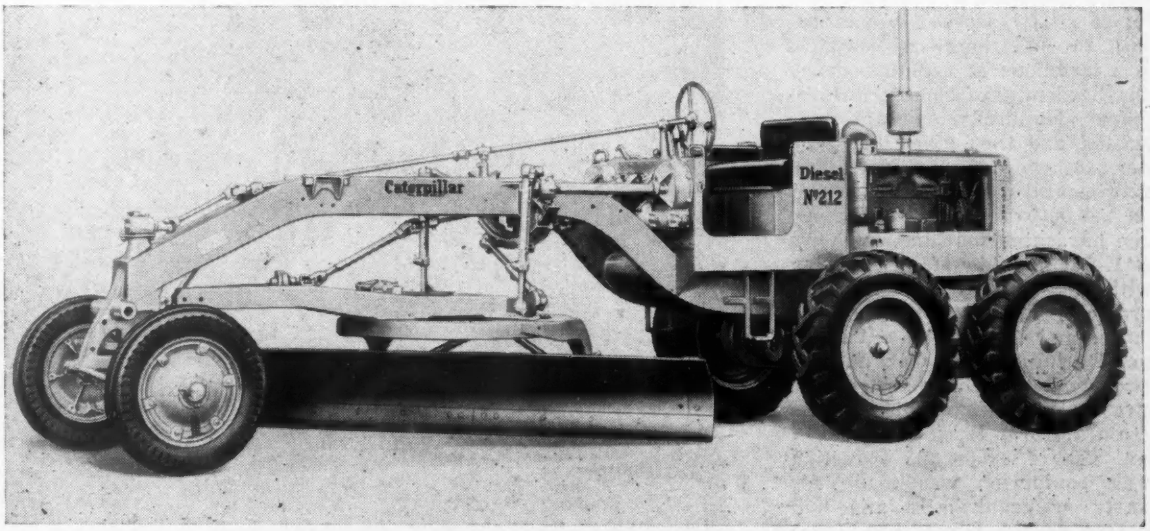


Maximum, rated and continuous performance of the D311 Diesel engine with full equipment including radiator and fan. The maximum output curves show the maximum output in BHP which the engine can develop with a clear exhaust, usable only for intermittent service applications such as excavators, locomotives, hoists, etc. The rated output curves show the load in BHP which the engine is capable of carrying for a period of 12 hours from each cold start, generally for 12 hour per day service. The continuous output curves show the maximum recommended load in BHP for continuous day and night runs for more than 24 hours. The continuous output does not exceed 90 per cent of the rated output.

power over the previous motor grader of this size and weight.

Refinements of the engine, as outlined by the manufacturer, include a ¼-in. bore increase, from 3¾ in. to 4 in., resulting in an increase to 252 cu in. in piston displacement. Other features include: stronger connecting rods and a heavier, stronger crankshaft; chrome-plated top piston rings; divided manifolding, which allows an independent port for each valve; larger air cleaners; and an improved oil-pressure control system. A new fuel injection valve design with the pressure-operated valve mechanism enclosed in a copper capsule, and an anti-friction bearing governor are given as additional improvements, together with a three-tube type oil cooler mounted beside and flush with the radiator core to provide more effective cooling of oil and water and to facilitat vicing and installation of blower fans.

The Caterpillar company states that both the new tractor and new motor grader offer features designed to improve performance and increase working life. The transmission, final drive and clutches of the tractor have been improved through the use of harder metals and better heat treatments. The motor grader has been provided with power-operated mechanical controls equipped with anti-coasting brakes to prevent creeping or coasting under load, increased speed in all ranges of the four-speed transmission, and an arched front axle to give maximum clearance. It is manufactured as a tandem and as a single drive.



No. 212 motor grader, equipped with single low-pressure tires. This grader is manufactured as a tandem and single drive. The single-drive model measures 21 ft overall, and weighs approximately 10,850 lb (shipping). The tandem drive version measures 21 ft 11 in. overall, with an approximate shipping weight of 13,130 lb.

Highlights of SAE Tractor Meeting

Farmall Cub Tractor and Implements

By C. A. Hubert and J. L. Hipple
International Harvester Co.

CLOSE cooperation between IHC's sales, manufacturing and engineering departments was required to make a tractor of the Farmall Cub size, having the same quality as large-size tractors at a cost in keeping with the size of the machine and versatile enough to be used in varied farm operations. Individual samples of the tractor were built, tested and analyzed, and the necessary modifications worked out. Then a sufficient number of tractors were built to carry on a program of experimental tractor and implement operations in various parts of the United States simultaneously. Dies and fixtures for crankshafts, connecting rods, magneto, carburetor and many other parts were made up to secure experimental machines representing, as nearly as possible, a production product.

For many months the manufacturing department of IHC worked in cooperation with the Westinghouse Corp. to develop a technique of radio-frequency induction hardening of small transmission gears. Hundreds of gears were heat treated and then given field and laboratory tests to determine their life. The experimental machine used in this work, a 250,000 cycle radio-frequency induction hardening machine, is shown in Fig. 1. It consists of an indexing table with four stations, a loading station, pre-heat, hardening and quenching station and finally the unloading position. During the pre-heat, and the hardening and quenching operations, the gears are rotated on their spindles to insure a uniform depth of hardness.

Liberal use of 9600-cycle induction hardening equipment was made for such parts as crankshafts and bull gears. One of the latest type Tocco machines was used for hardening both main and connecting rod journals of the crankshaft. Induction hardening was used with many other parts which were difficult to control with conventional hardening methods. The forge shop at Louisville Works, where the Farmall Cub is built, also uses induction heating for all forging stock. From the engineering point of view, this will result in less decarbonization and improved forgings. One inch diameter stock can be heated in six to eight sec.

A six-station center-column automatic way machine was developed specially for drilling, boring, reaming, facing, counter-boring and tapping of governor housing for the Farmall Cub. Each station of this machine uses three fixtures which engages the casting to be positioned in three different positions under each station, or eighteen fixtures in use simultaneously. This machine is entirely automatic and produces approximately forty completed pieces per hour. No further machining operations are required on the casting after being reamed by this machine.

The Sheer-Speed gear shaper performs a rather revolutionary method of cutting gears, and increases the output over the conventional method of gear cutting by approximately five to one. This machine is capable of cutting both spur and helical gears. It operates on a forming principle using several tools, and produces each tooth in the gear while the gear blank is reciprocated.

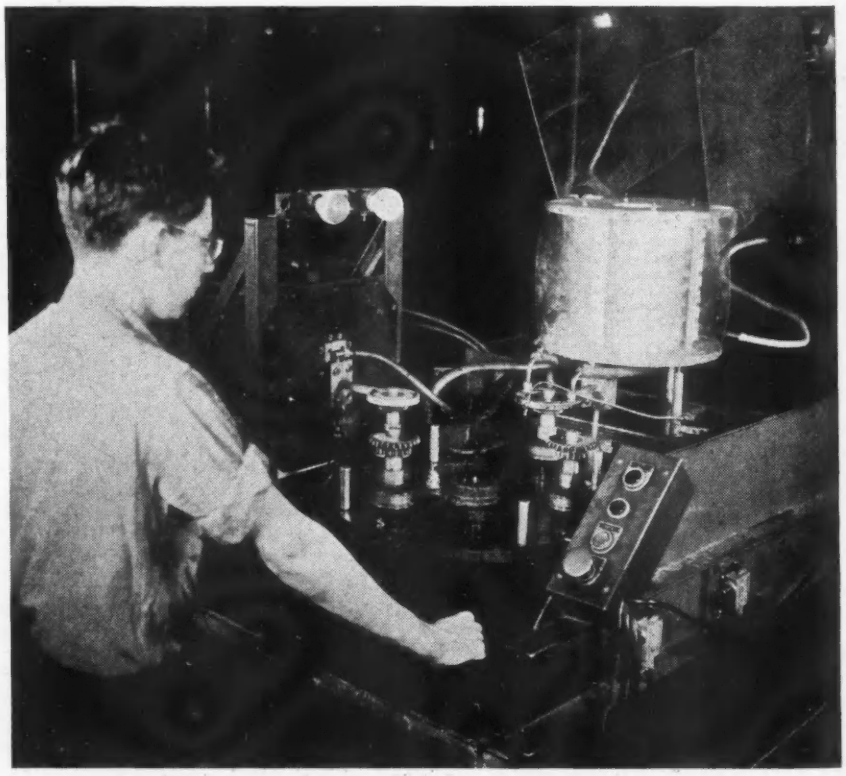


Fig. 1—This experimental 250,000-cycle induction hardening machine was developed by Westinghouse Corp. in cooperation with the International Harvester Co. for heat treating small transmission gears used in the Farmall Cub

Presented herein are abstracts of some of the important papers presented at the recent SAE National Tractor Meeting in Milwaukee, covering such subjects as production innovations in manufacturing the Farmall Cub, a comparison of stationary and rotating axles for single and dual wheels, advantages of liquid petroleum gas as an engine fuel, and a mathematical analysis of the tractor-seat problem.

The tools are then gradually fed to the correct depth, the feed occurring at the end of each stroke. During the return stroke the tools are pulled away from the work to provide clearance. The head containing the tools controls the accuracy of the gears, the number of teeth, pitch and pressure angle. This machine has been found to be very accurate, and produces a high quality gear.

In order to check the six bearing bores of the transmission housing, a battery of Sheffield Precisionaires is used. These instruments register the variations of air allowed to escape from the gage by the dimensions of the bore into which it is introduced. The measurement of oversize, undersize and out of round dimensions is so exceptionally accurate that they can be gaged to within 0.0002 in. of specifications.

Another machine used is a six-cycle automatic Magnaflux designed especially for checking International Harvester crankshafts for the A and C models and Farmall Cub. The crankshafts are placed on a conveyor, and are carried to a station and magnetized. They are then sprayed and shifted to the position where an operator makes a careful inspection for cracks. When this check is concluded, the shaft moves to a demagnetizer and then to a washer.

Comparison of Stationary and Rotating Axle Idler Wheel Mountings for Tractor and Implement Service

By George W. Curtis, Manager
Milwaukee Div.
Timken Roller Bearing Co.

AXLE designs for use with sliding bearings have generally been much too large for the most economical application of roller bearings. An equivalent load can be carried by tapered roller bearings having a considerably smaller bore and a greatly reduced overall width than are usually used with slide bearings. To determine how far the old axles designed for friction bearings could be reduced in diameter, theoretical calculations and test procedures were carried out on stationary axles. A rotating stub axle, attractive from a cost standpoint for many applications, was also explored. Studies and tests were made of stationary axles to provide a comparison between sliding bearing wheel mountings and tapered bearing mountings to carry 1800 to 2200 lb. load per wheel in typical implement service such as combines, corn pickers, forage harvesters, manure spreaders and the like.

A sliding bearing design having particularly economical characteristics in use on a number of machines having an axle diameter of 1⅞ in. and 1 15/16 in., is shown in Fig. 2. The axle diameter is 1⅞ in., the hub length seven in. and the distance from axle support to center of tire is 5⅝ in. The sliding bearings are essentially symmetrical around the centerline of the tire. In this make of machine one wheel operates under a continuous load of 1800 lb pr wheel. The other wheel load is variable between 1300 lb minimum and 2100 lb maximum. Under conditions of 2100 lb load on a single type wheel the 1⅞ in. axle will operate under a static bending stress on level ground of 18,000 lb. The wheel tread is 105½ in. and the height of the center of weight or gravity approximately 40 in. above the ground.

Table I—Comparison of Axle Strengths

Design	Axle Diam. (in.)	Amount Overhang (in.)	Allowable Load per Tire (lb)	Bending Stress Level Ground (psi)
Stationary	1⅜	9	1275	45,000
Rotating	1⅜	6⅜	1800	45,000
Rotating	1⅜	5⅝	2050	45,000

A tapered roller bearing stationary axle for single wheel use, shown in Fig. 3, was developed for the 2100 lb per wheel maximum load conditions with a 1⅜ in. axle diameter, 0.9 in. moment

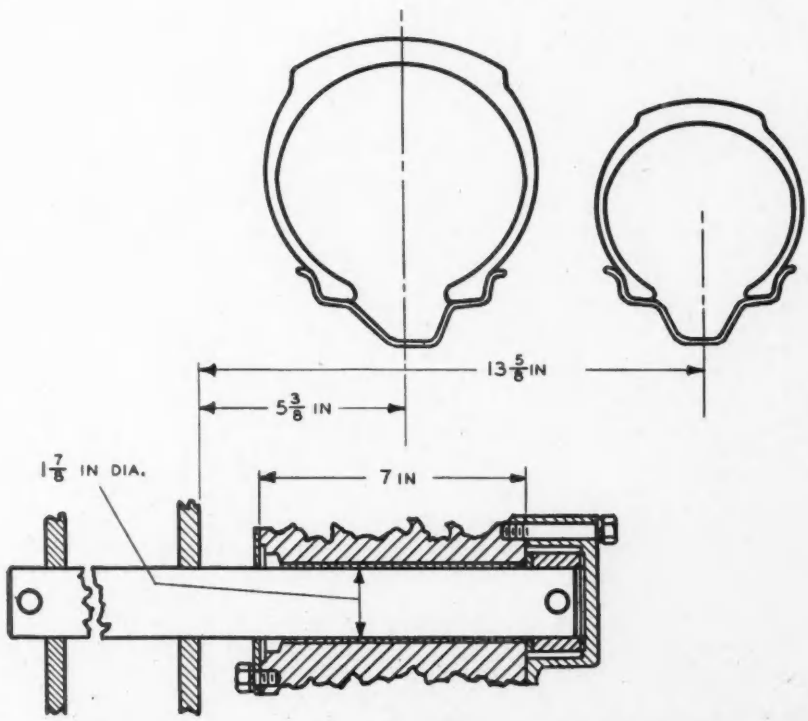


Fig. 2—Sectional drawing of the sliding bearing design on a stationary axle

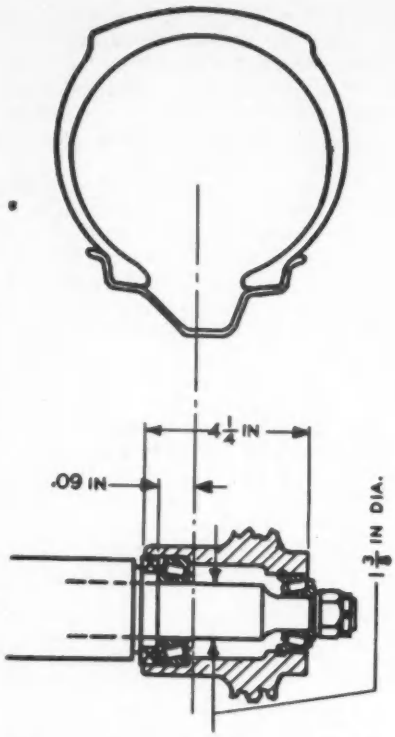


Fig. 3—Tapered roller-bearing stationary axle for single wheel use

arm center of tire to outer end of axle support, which is the assumed point of maximum axle stress and proportional bending. Using the 0.9 in. moment and 2100 lb wheel load, the static axle stress comparison is 7400 psi for the tapered-bearing 1⅜ in. axle against 18,000 psi for the friction-bearing 1⅞ in. axle on level ground. An estimate of the weight and machine time reductions indicated a 70 per cent decrease in axle weight, a 30 per cent reduction in weight of other parts, and a 20 per cent decrease in machine time. Some of the machinery builders after their original estimates advised that the above weight and machine time savings originally made up the difference between cost of the friction bearings and the cost of the tapered bearings. This 1⅜ in. diameter axle was thoroughly tested and proved by shock tests in the laboratories of the Timken Roller Bearing Co.

The point of highest static axle stress in rotating axles is considered to be essentially at the outer face of the outer bearing, and proportionate to the amount of tire overhang. Studies of rotating stub axle designs indicated that a worthwhile reduction of overhang is definitely possible. In Fig. 4 a standard wheel of 2¼ in. offset results in an outer tire overhang or moment arm of 6⅜ in. Other standard wheels having as much as three in. offset would provide a moment arm of 5⅝ in. This compares with 13⅝ in. moment arm of Fig. 2 and provides for a proportionate increase in the live axle strength.

Generally speaking, the rotating sub axle design of Fig. 4 will closely approximate the cost of the stationary axle design of Fig. 3. This statement is made on the basis of the fact that essentially the same weight of materials, same amount of machine work, and essentially th same bearing costs will be possible in both designs. It should be understood that this statement is merely given as a rough comparison, and it is believed that a final evaluation of the possible economical gain will depend upon the particular practices in each different production plant and the variables, such as type of wheel, material used and type of axle design in each case.

How the comparative strength of the axle may be increased by reducing the tire overhang of the outer tire from the nine in. distance of the stationary axle design of Fig. 3 (when used for dual wheels) to either 6⅜ in. or 5⅝ in. of Fig. 4, is shown in Table I.

Two other features of the rotating axle design are worth noting. First, the design permits using the larger bearing in the outer position where the tire overhang imposes the greatest load; and second, the rating of any given bearing size is appreciably higher when applied to a rotating shaft than to a stationary shaft.

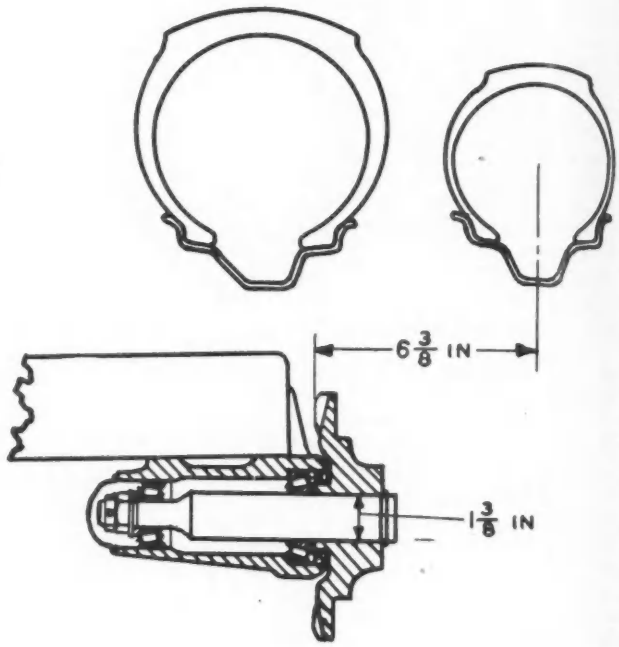


Fig. 4—Rotating stub-axle design for dual wheels

Butane and Propane as Tractor Fuels

By E. A. Jamison and J. R. Strother
Philgas Div.,
Phillips Petroleum Co.

INVESTIGATIONS in recent years have indicated most conclusively that there are a number of worthwhile advantages in the use of liquefied petroleum gases as an engine fuel. Those advantages stem largely from their high anti-knock qualities, thus making possible the use of high engine compression ratios, resulting in increased power and lower specific fuel consumption. Other advantages associated with the use of a dry gas as fuel are the absence of crankcase dilution and substantial reduction of carbon formation within the power section.

A compression ratio of 8.0-8.5 to 1 appears to be the practical limit for butane, and increases from this point require mixtures of propane in order to raise further the anti-knock rating. The actual limit of compression ratio depends on engine design as well as the means by which the ratio is increased. For example, small high-speed engines get by with higher ratios than do larger ones. Also, experience indicates that L-head engines are less critical to variations in knock qualities of fuels, but do not react as favorably from a power and fuel economy standpoint, as do valve-in-head engines.

While a compression ratio of 9.0 to 1 is by no means the limiting power for propane for knock, it appears to be a practical limit from an engine life standpoint and also from a fuel cost standpoint. This is based upon the fact that it is desirable to maintain a liquid-petroleum gas blend as high in butane content as possible, because butane has approximately ten per cent greater heating value which results in ten per cent saving in fuel cost where butane and proane are sold at the same price per gallon.

The use of cold intake manifolds, not absolutely necessary, is recommended to offset partially the loss in volumetric efficiency when using liquid-petroleum gas. This is accomplished by removal of the heat box from the manifold and by attaching suitable shields to retard the radiation of heat from nearby exhaust piping. Further improvement in engine performance may be had by rigging the carburetor air intake to draw cold air.

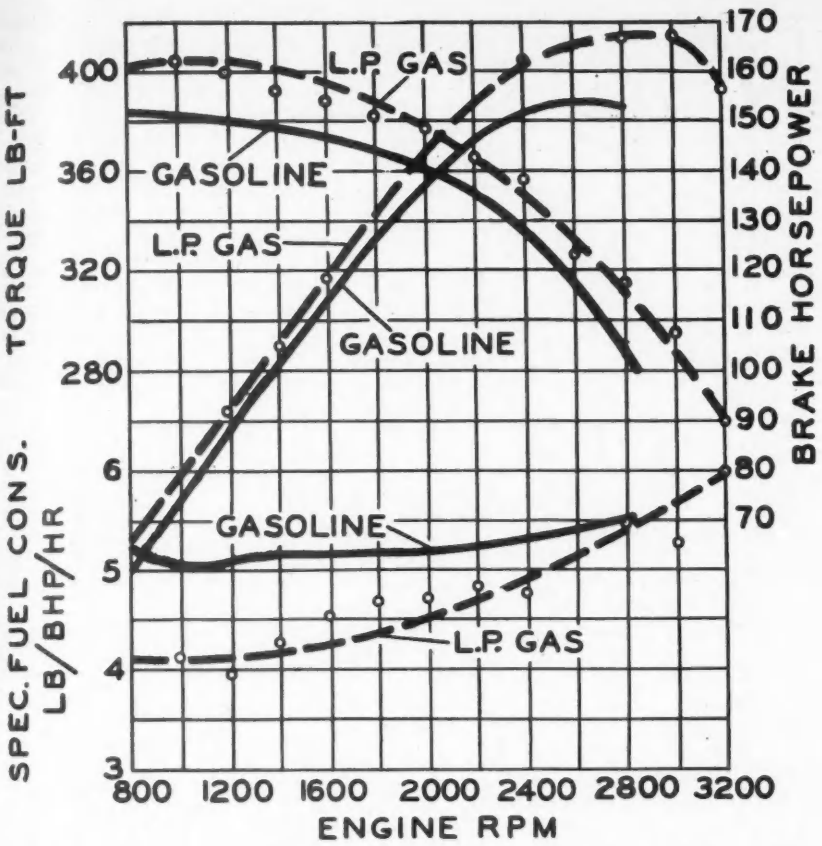


Fig. 5—These performance curves of a medium-duty truck engine show the gains in torque, bhp and specific fuel consumption obtained with liquid petroleum gases. The LP gas blend used was 80 per cent butane and 20 per cent propane. Compression ratio for the LP gas was 8.0 to 1, and for the standard gasoline, 6.0 to 1. Optimum spark and maximum power mixtures were used in both cases

The rate of flame propagation for liquid petroleum gases is somewhat slower than for gasoline, and experience has shown that optimum timing may be up to five to ten deg earlier than the optimum for gasoline. Also, cold spark plugs are recommended in order to reduce the likelihood of the spark plug becoming a source of preignition within the combustion chamber. The higher cylinder temperatures accompanying an increase in compression ratio naturally tend to heat the spark plug and exhaust valve in excess of what would be expected at conventional ratios. The installation of the coldest plugs available will help in avoiding hot spots. Furthermore, hot plugs are not needed because lead accumulation and carbon formation are not problems.

All recognized liquid petroleum gas carburetion systems consist of two or more units. Fuel leaves the high-pressure container under its own vapor pressure, and is piped through heavy wall tubing to a heat exchanger unit. At this point heat is absorbed from the engine cooling water, and liquid pressure is reduced to some intermediate value by a diaphragm actuated pressure regulator. Further heat is absorbed by the vapor, and a second stage of pressure reduction takes place. By now the fuel is a dry gas, and its pressure is slightly less than atmopheric so that venturi suction is required to introduce it into the engine. The carburetor itself is a simple mixer consisting of a metering device, such as a venturi, to proportion the air and fuel; the fuel enters the air stream through a fuel tube or through ports in the venturi.

There are many variations and refinements of this installation. Some reduce to the final pressure in only one stage, while others use three stages of pressure regulation. Several manufacturers provide a positive lockoff device to eliminate gas leakage throuh the mixer when the engine is off, and starting can be accomplished only by mechanically opening the lockoff. Others depend upon the seating of the final stage gas regulator for fuel shut off.

The performance curves of Fig. 5 show what may be expected with a medium-duty truck engine when the above design changes are made.

A Practical Approach to Operator's Comfort

By C. W. Cannon and Earle Cox,
Tractor Division
Allis Chalmers Manufacturing Co.

IN MANY designs of seat suspensions, the designer has utilized a relatively stiff spring in an attempt to satisfy the requirements of his problem. With these stiff springs the seat motion does not deviate greatly from that of a seat solidly attached to the tractor. Hence, the shocks imposed on the tractor by the tires are transmitted almost undiminished to the operator.

While shocks or rate of change of acceleration $\left(\frac{d^3y}{dt^3}\right)$ is readily measurable, at present there exists no accurate measure of the ability of the operator to withstand shock. Therefore it seems that the best solution to improved operator comfort is to consider a conventional present-day tractor seat, and attempt to reduce the shock intensity on it while still keeping it in a desirable location from the visibility standpoint. By using tire deflection curves it is possible to obtain the force which acts on the tire at any instant, and from this obtain equations of motion for any point on the tractor. Thus, knowing front and rear axle displacements as a function of time, it is possible to determine the shock on the operator.

From Fig. 6, it can be seen that the front tire deflection curve is nearly a straight line above a load of 500 lb. This straight line curve characteristic leads to simple differential equations of motion for the axle centerline regardless of shape of bump encountered. Curves have been plotted from these equations of motion, and shock values on the operator have been determined. By mathematics it is found that the bump whose surface is at 45 deg to the horizontal will produce the maximum vertical shock on the tire.

The rear tire deflection curve for air-filled tires, shown in Fig. 7, is also a straight line above a load of 500 lb. Forces applied to the rear tires will cause motions which can be evaluated in the same manner as for the front tires. If the front tires encounter a bump 6¾ in. high whose surface is 45 deg to the horizontal while the rear tires roll on smooth ground, the front axle centerline moves according to Fig. 8 when the tractor velocity is 10 mph. The bump causes the axle centerline to raise nearly 20 in. and drop about 3½ in. below its normal running

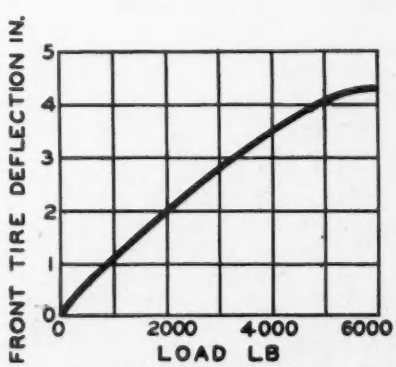


Fig. 6—Deflection curve of front tires. Tire inflation pressure is 28 psi for no load

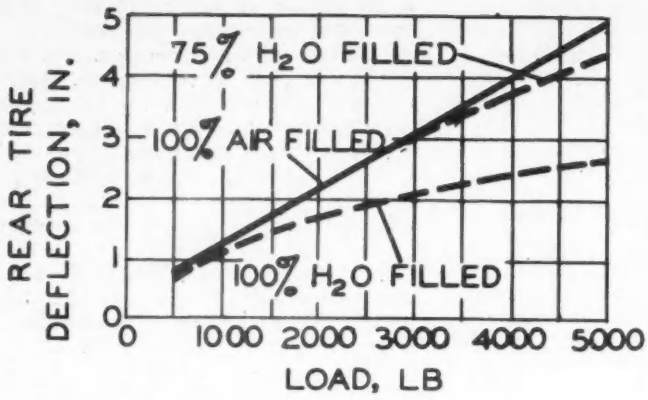


Fig. 7 — Deflection curve of rear tires, showing spring characteristics of tires filled 75 per cent with water, 100 per cent with water and 100 per cent with air. Inflation pressure was 12 psi for no load condition

sorber acts as an addition to the spring force and in extension it controls the recoil of the spring.

Another item which affects riding comfort is the amount of solution in the tires. Filling the tire 75 per cent with solution does not greatly alter its spring characteristics, but with a 100 per cent solution filled tire the rate is much higher as load increases. The change from air fill to 100 per cent water fill is in a sense similar to assuming heavier springs in the tire. However, the water being non-compressible reduces the recoil of the spring to that of the tire and tube, where with the air filled tire the compressed air acting as a spring also. Thus the overall trend of changing to 100 per cent water fill is to dampen out the bouncing at the expense of somewhat higher initial shocks. The weight of the solution in the tires being a considerable per cent of the tractor weight would enlarge all of the figures where inertia and acceleration of gravity are used.

position. Such a bump will cause the rear axle centerline to raise only 5½ in. and drop 3½ in.

The shock on the front and rear axle is shown in Fig. 9. Points of discontinuity occur because of sudden changes in the shape of the bump. These will not effect the end result since maximum values are the only consideration. For small bumps the shock is reduced and the periphery of the tire is always in contact with the ground. The right hand end of the shock curves shows the values of shock for a condition when the tire always has ground contact.

Since equal shocks are not imposed on the operator by front and rear wheels, it is desirable to determine the effect of seat location on operator shock. Fig. 9 shows that the shock at the centerline of the front wheel has a maximum value of 183 g's per sec. The shock at the centerline of the rear axle has a maximum value of 67 g's per sec. Since the amount of shock which is transmitted from either axle to the riding position is inversely proportional to the distance between the riding position and the centerline of the axle, for minimum shock the seat should be located between the front and rear axle. For example let x = distance forward of the rear axle at which point the shock is a minimum. Then:

$$\frac{67}{x} = \frac{183}{87 - x} \text{ or } x = 23.3 \text{ in.}$$

If the seat could be located 23.3 in. ahead of the rear axle on a line joining the centerline of the axles, the shock would be a minimum. Its value would be

$$67\,\frac{(87 - x)}{87}$$ or 49 g's per sec. By

relocating the seat the maximum shocks imposed on the operator could be reduced to 56 per cent of its former value. Obviously it would be impossible on most tractors to relocate the seat in such a fashion. But the seat should be located as near as possible to the optimum position for any particular tractor after making considerations for visibility, control of tractor and ease of mounting.

If other considerations make it impossible to change greatly the seat location, then the proper seat suspension becomes even more important.

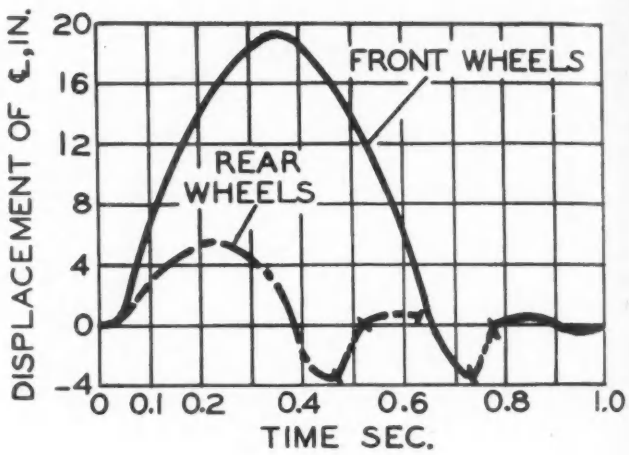


Fig. 8—Displacements of front and rear axles on striking the same size bump are represented in these curves

Since the relative motion of the operator due to front wheel shocks is small compared to that obtained from rear wheel shocks it is advisable to attach the absorber to take care of the rear wheel shocks. To eliminate rear axle shocks a soft spring should be used and the absorber should have a very low rate on compression and a higher rate on extension. In compression the ab-

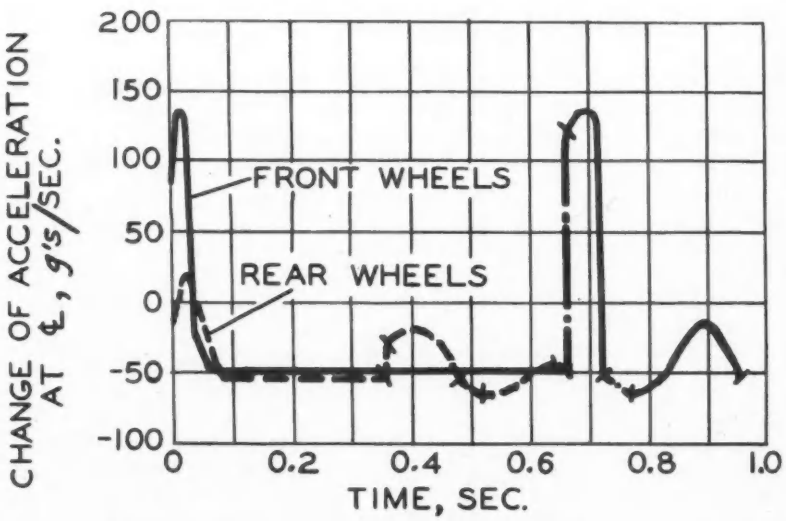


Fig. 9—These curves show the shock on front and rear axles when striking the same size bump

Mexico Best Export Market for Motor Vehicles in 1946

LARGEST export market for United States motor vehicles in 1946 was Mexico which purchased 31,356 new passenger cars, trucks and buses during that year, according to the U. S. Department of Commerce. Total value of these vehicles was $40,102,724. Other automobile products exported by the U. S. to Mexico during 1946 raised this dollar figure to $67,217,624, an increase of 163 per cent over the previous peak year of 1941 when Mexico took products worth $25,574,882. Of Mexican imports from other countries 300 passenger cars and 243 trucks came from Great Britain; eight passenger cars and four trucks from France; six trucks from Canada, and 21 passenger cars, four trucks and three chassis from all other countries.

Imports from the U. S. in all automobile products registered increases in 1946 over 1941 with the exception of parts for assembly and engines for assembly. These exceptions can be explained by the fact that the assembly of motor vehicles in Mexico was just being resumed after the shut-down of the plants during the war. Large increases were made in exports of automobile replacement parts and garage equipment, as shown by the figures in the accompanying table.

U. S. Exports of Automobile Products to Mexico, 1941-46

	1941		Year Average 1942 to 1944		1945		1946	
	Units	Dollars	Units	Dollars	Units	Dollars	Units	Dollars
Passenger cars, new	9,757	8,556,531	1,011	1,064,500	131	162,251	10,950	11,507,707
Passenger cars, used	1,299	341,263	733	616,300	635	514,648	750	573,013
Trucks and busses, new	9,820	7,928,600	1,546	2,415,026	4,517	6,652,731	20,406	28,595,017
Trucks and busses, used	427	159,352	444	433,296	2,586	3,514,097	6,545	8,446,977
Trailers	87	54,970	182	126,508	596	695,927	2,623	1,877,344
Motorcycles	130	45,359	73	26,082	194	73,188	709	293,816
Motorcycle parts	.....	16,771	.....	11,315	.....	13,491	.....	39,837
Parts for assembly	.....	4,916,273	.....	412,592	.....	413,938	.....	937,398
Automobile engines for assembly	6,297	728,841	1,131	139,235	121	29,344	398	116,738
Automobile engines for replacement	75	10,174	93	16,109	927	197,038	954	267,769
Spark plugs	334,893	87,997	618,594	169,127	1,070,959	308,132	1,006,819	298,836
Other automotive parts for replacement	.....	1,835,324	.....	2,102,311	.....	6,136,102	.....	10,862,346
Automobile accessories	.....	200,986	.....	134,944	.....	432,083	.....	935,628
Automobile batteries, 6 and 12 volt	15,956	95,938	8,917	57,445	9,839	75,632	13,325	101,557
Starting, lighting and ignition equipment	.....	23,067	.....	167,293	.....	602,994	.....	615,758
Brake lining and clutch facing	.....	150,635	.....	329,373	.....	270,952	.....	310,999
Gasoline and oil pumps	855	112,884	642	65,326	782	24,477	1,394	112,897
Other garage equipment	.....	309,917	.....	197,779	.....	550,811	.....	1,325,987
Total value	.....	25,574,882		8,484,561		20,667,835		67,217,624

Source: Foreign Commerce and Navigation of the United States.

This table shows that U. S. exports of automobile products to Mexico for 1946 increased 163 per cent in dollar volume over exports for the previous peak year of 1941

Ingenious Baling Machine

THE Bale-O-Matic, an ingenious hay baling machine, was recently added to the extensive line of tractors and agricultural equipment made by the Minneapolis-Moline Implement Co., Minneapolis, Minn. It is capable of producing rectangular bales comparable in density and weight with the bales made by heavy hand tie machines. The bale tieing device is extremely intricate and ingenious. The machine is powered by a Model VE-4 Wisconsin, four-cylinder aircooled engine of V-type, having a bore of 3 in. by 3¼ in. stroke, 91 cu in. displacement, operating at 2000 rpm. The machine itself is 18 ft long, 10 ft wide, and eight-ft, two in. high, with weight held down to 4550 lb.

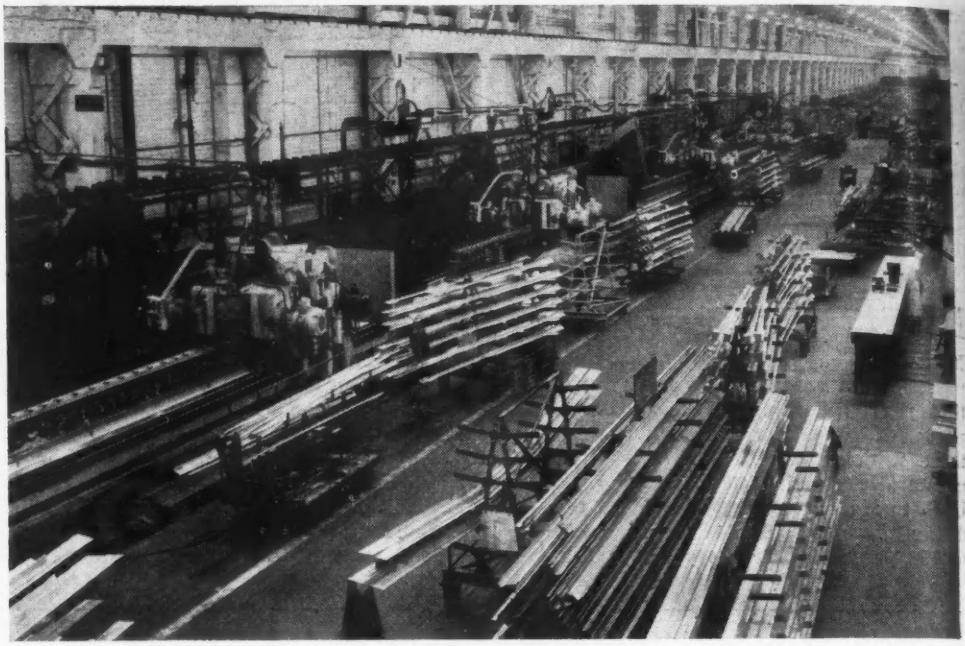
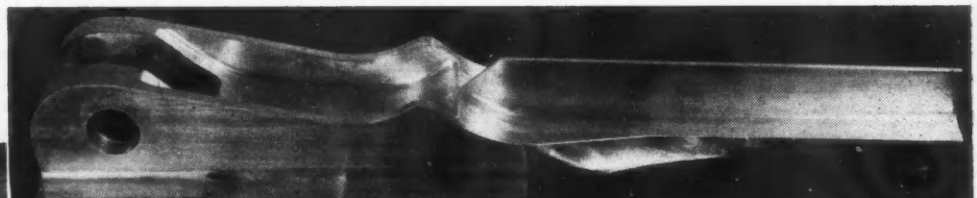


Fig. 1 — View of spar-cap department at El Segundo plant of Douglas Aircraft Co.

Automatic Milling Machines

Solve Spar Cap Production



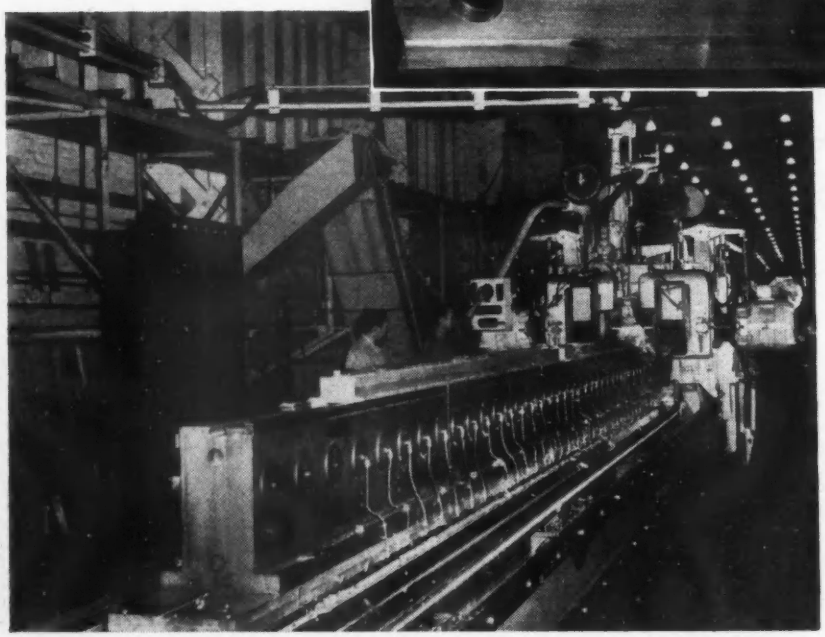


Fig. 2—(Above) Ingenious modern tooling makes it possible to produce this spar cap hinge at the rate of eight pieces in 30 min. If made on conventional equipment, layout and machining would take 30 hr per piece.

Fig. 3—(Left) Front view of the five-spindle spar cap mill which can machine parts up to 32 ft long. Spindles operate individually on template guides, and front spindles are driven by 40 hp motors at 3500 rpm.

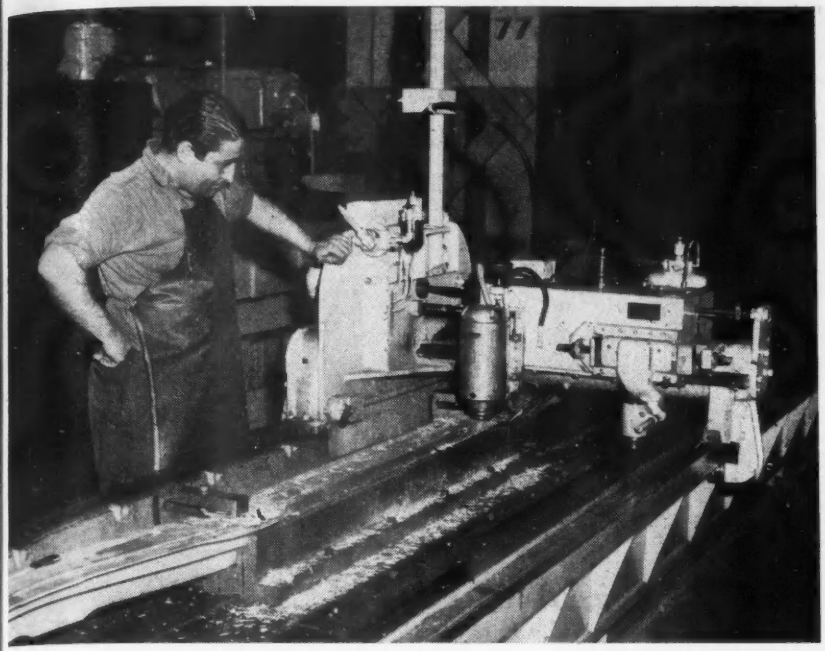


Fig. 5—The template-guided router shown here illustrates a side-cut operation on a 32-ft. spar cap. Note the template guide to the right of the cutter.

By V. C. Fergen

Foreman, Spar Cap Dept.

and

C. R. Wulffsohn

Ass't. Supt., Production Control and Fabrication. El Segundo, California plant, Douglas Aircraft Co.

Problem *at Douglas*

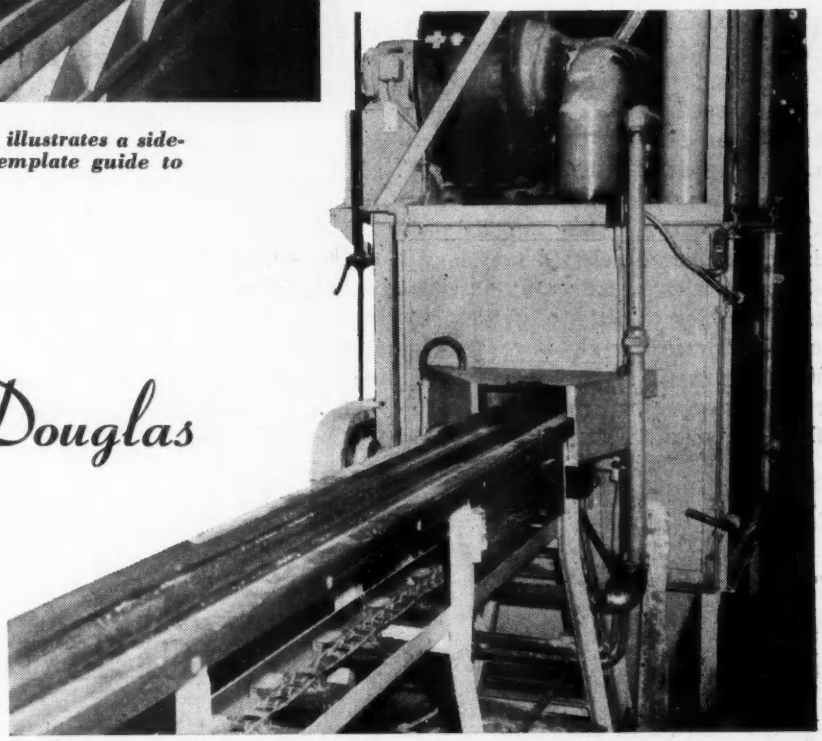


Fig. 4—This automatic conveyor-fed sand blasting machine, designed and built by Douglas El Segundo engineers, eliminates previous method of costly hand burnishing and polishing operations. Photo shows a large spar cap entering the blast chamber.

SPECIAL automatic milling machines, originally developed for high-volume production, are proving extremely useful at the El Segundo plant of Douglas Aircraft Co. in milling heavy spar caps for the AD-1 Skyraider (see Fig. 1). Rapid advances made in aircraft design during recent years have necessitated heavy and complex construction of the main structural members. This is particularly true of the wing and center section where the main internal beams or spar caps are now designed to be machined from single billets of aluminum alloy material. These parts present a serious tooling and manufacturing problem in quantity production, because of the tremendous amount of material to be removed from the billet, and the variable and complex nature of the many cuts involved.

The part shown in Fig. 2, for example, is the hinge end of a spar cap which may be produced as a separate item, or may be integral with the spar itself. As produced on conventional mills, such a part would require 30 hr of layout and machining time, whereas present machines and ingenious tooling make it possible to produce eight of these parts in 30 minutes.

Production starts by placing two 140-in. billets on the Farnham spar mill, shown in Fig. 3, for performing all of the body cuts. Parts are then moved to a Farnham twist mill for producing the angular cuts necessary to make the surface conform to the wing contour. This is followed by a straightening operation on a hydropress, after which each billet is cut into four parts and moved to the heat treat ovens for aging to the hardened or ST condition. Subsequent operations include the forming of a tapered splice cut for joining the hinge to the main spar, drilling the main lug hole and then taking minor detail cuts on

conventional mills. As a final step before passing to inspection, all sharp corners are broken and the part is sandblasted (see Fig. 4).

Machining of the T-shaped spar cap itself also involves some interesting operations, including that shown in Fig. 5 where sections are routed out on a high-speed Farnham mill. The form of the cut is controlled by means of a template attached to the machine bed.

A highly ingenious setup is indicated in Fig. 6. At one point in the production of spar caps for the horizontal stabilizer, it is necessary to perform a bending operation to establish the dihedral angle. The earlier methods proved unsuccessful since the material was in the ST condition and broke under the bending load. Parts now are machined and straightened in the SW state, aged to ST and bent by the use of specially designed dies heated to 275 F.

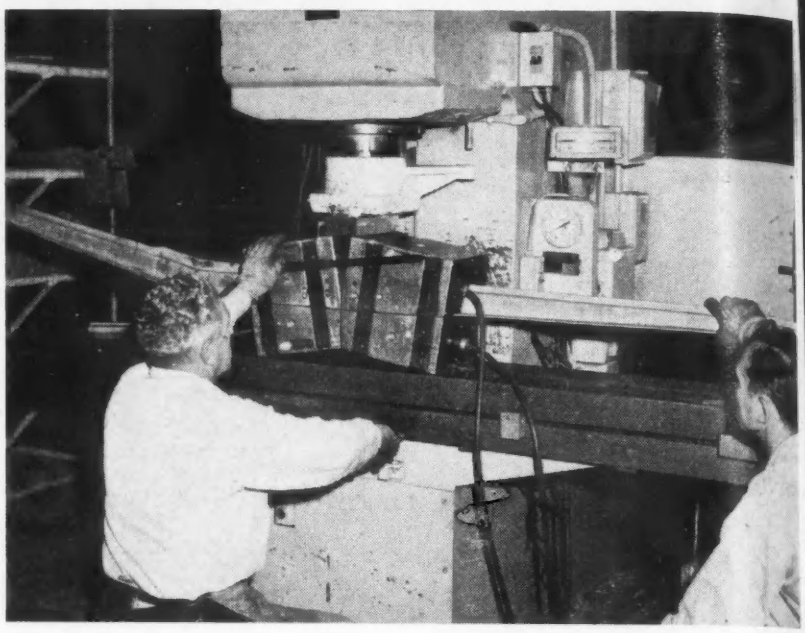
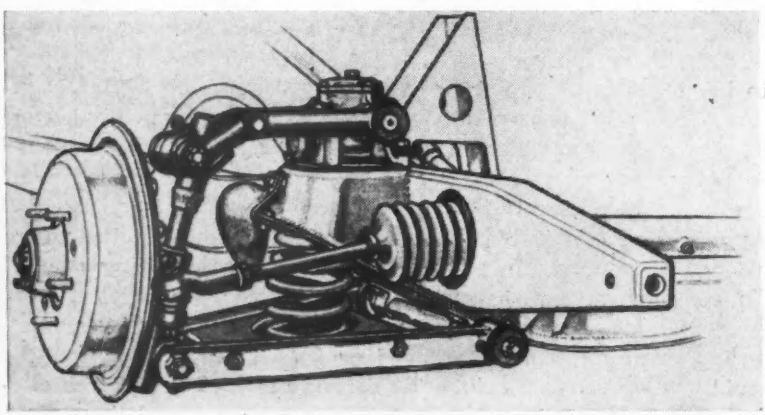


Fig. 6—Equipped with specially designed heating elements, these dies solved the problem of bending horizontal stabilizer spar caps in the ST condition.

One item which has received particular attention in the Douglas plant is the matter of chip disposal. All of the machines described above produce a tremendous volume of chips and in order to dispose of these in the most efficient manner, drain troughs have been installed. These run the full length of the department alongside the machines, and chips are washed into them by a heavy flow of coolant. From the troughs the chips and coolant flow into a sump from which the coolant is returned to the machines by means of a pump, and the chips are picked up by an elevator and transferred to an overhead conveyor which carries them outside and dumps them into waiting trucks for disposal. In this way the immense volume of chips is readily handled without interfering with production operations.

Something Different in Wishbone Design

THIS unusual arrangement of wishbones, links and a coil spring provides independent front wheel suspension for the new British 1¼-liter M.G. sedan. The triangulated lower wishbone is anchored to the frame on rubber bushings, and carries at the wheel end a bearing for the foot of a long swivel pin to which the steerable stub axle is attached. At the head of the swivel pin is a bearing which carries the apex of the upper triangulated wishbone, which has its fulcrum within the casing of a hydraulic damper. The under side of the steel housing of this damper provides the head seat for the coil spring, the lower end of which rests in a pan in the lower wishbone. The rubber bellows in the drawing encloses the universal ball joint for the rack and pinion steering.



Courtesy of THE AUTOCAR, *London*

Also of interest in the design of this new British passenger car is the use of a rubber mounted stabilizing bar. This control link, mounted just behind the rear axle, connects each end of the axle to the opposite side of the frame to prevent the car from swaying.

Big Demand for Cars to *Continue Three to Five Years*

Sound Business Policies Shun Such Questionable Expedients as Black Market Practices, Under-Allowing on Trade-In Cars, Accessory "Loading," and Hidden Charges

By M. E. Coyle
Executive Vice President
General Motors Corporation

ACCOMPLISHMENTS in the automobile industry, compared to what was anticipated, have been most disappointing. Reconversion has been delayed by strikes and the shortage of materials resulting from strikes. The aftermath of labor troubles lasts longer in many cases than the strike itself. The flow of material has been interrupted and must be reestablished. Some materials become readily available in ample quantities, but they cannot be used except in relation to those in shortest supply. The principal difficulty has been in obtaining steel products in sufficient amount. The shortage of steel has been highly publicized, and many opinions have been expressed as to the present and future situation. The subject is of sufficient importance, for it controls the quantity of product the industry can build.

The steel industry has approximately 90,000,000 tons of ingot capacity annually. At present prices it would cost three times as much as prewar to install new ingot capacity, and it would require two years to bring it into production. The steel producers are unwilling to make these capital expenditures at such high prices and to gamble that the capacity will be needed over a sufficiently long period to justify the investment. In no peacetime year from 1900 to 1939 was the steel industry required to operate above 90 per cent of ingot capacity. In seven of the highest years, the rate was above 80 per cent, and in eight of the lowest years it was 36.1 percent. The average for the forty years was 60 per cent. Thus, in the light of past experience, the reluctance of the steel producers to expand facilities at present high costs is understandable.

Rolling the ingot into saleable steel products results in a loss of 30 per cent so the 90 million tons of ingots gives 60 to 65 million tons of saleable steel. Figures for the first six months of 1947 show that the automotive industry received 14.6 per cent of all steel shipped, the highest of any customer. Construction was next with 9.6 per cent, followed by converting and processing, railroads, containers, machinery, electrical appliances, utensils and cutlery, in that order. Of the 60 million tons of finished steel capacity, there is only 24 million for flat rolled, of which only six million can be cold rolled.

General Motors, as an example, requires 75 per cent of their steel in flat rolled products and the majority of this in cold rolled. This is the type of product that is in shortest supply at the mills. Due to high cost of production, many of the old hard finishing mills were abandoned during the war and are being replaced by new continuous mills. These will not, however, be fully available until the first quarter of 1949. It is believed that there will be difficulty in increasing the rate of production materially until the last half of 1948. When all the new mills and those now under construction are in production, the steel industry will have a cold finishing capacity of 9,600,000 tons annually, an increase of 60 per cent above the present level.

That should solve the problem on sheet and strip, but the automobile industry is not certain of availability in adequate quantity of pig iron, copper, lead, zinc or tin. These basic materials have not, so far, limited production, but that was because the limits imposed by steel did not test the market of the other critical materials. However, each automobile manufacturer is doing everything possible to secure more material and to accelerate production.

While there are apparently no major labor disturbances at the moment, the labor situation remains unsettled and uncertain. There are constant interruptions of production in plants of suppliers where the importance of the strike as to number of workmen involved does not have sufficient visibility to attract national attention. There have been repeated stoppages in coal production. Each of these interruptions reduces the inventory of coal above ground. The United States Steel Corp. requires 115,000 tons of coal per day to operate, and other steel companies in ratio.

Opinions vary as to the peak volume the industry will attain in any single year or the period that high volume will continue. It is not believed that passenger car production in 1947 will exceed 3,750,000 units. Production in 1948 may reach 4,500,000, but in any single year will not exceed 5,000,000 passenger car

(*Turn to page* 80, *please*)

This article was abstracted from a talk delivered by Mr. Coyle before a meeting of the Pennsylvania Automotive Association in October at Atlantic City.

by Robert McLarren

Practical Approach

Latest chapter in the "quiet airplane" program is that announced by the NACA-sponsored Harvard-MIT noise "assessment" research program. The New England group's mission is to determine the practical noise level for lightplanes, NACA having demonstrated the practicality of building a lightplane engine-propeller-muffler combination producing a noise level of any desired intensity down to near-zero. Determination of the maximum desirable noise level of lightplanes will be made in a simple and direct manner: a specially equipped Stinson Voyager will be flown over residential areas and the quantity of resulting phone call complaints will be scientifically logged. While it is desirable that a lightplane be as quiet as possible to those on the ground, it is equally desirable to the manufacturer that as high a noise level as is consistent with residential peace be used with resulting economy of design and manufacture of the airplane. Dr. Otto Koppen, designer of the prewar General Skyfarer stall-proof lightplane and now MIT engineer, has designed an exhaust system utilizing the jet ejector cooling principle with its inherent noise reducing characteristic.

Subsidized Races

National Air Race followers are nonplussed at the recent United Aircraft revelation of whole-hearted cooperation with Cook Cleland's preparation of his Goodyear F2G-1 Thompson Trophy winning plane. UAC has widely publicized the fact that its Hamilton Standard Propeller division worked on Cleland's propeller, Pratt & Whitney division on his big R-4360 engine and Chance Vought division on his airplane prior to its flight to Cleveland, Ohio, for the race. There's no secret about Lockheed's close attention to Tony LeVier's crimson P-38 Lightning or Allison's close cooperation with Mustang, Lightning, Airacobra and Kingcobra racing entries. Ranger engine division of Fairchild Engine and Airplane Corp. made the conversion of an AT-6 entrant in the Halle Trophy Race (plus a second conversion which was done during the war). This places many "backyard" racing pilots in the somewhat ludicrous position of competing directly with several million dollars worth of engineering and technical talent in the grooming of planes for the prize money. Air Race entrants are used to such minor sponsorship as free fuel, oil, spark plugs, etc., with the colorful trade mark of the donors on the fuselage side. But this latest revelation has literally stunned many, at least among those who were not in the "know" on the subject. Many racing pilots favor strong "police" action against this practice in future races with the Goodyear Trophy type racing requirements gradually assuming overall control of the participants.

New Turbojet Systems

A major objection to the turbojet engine is its comparatively narrow band of effective operating conditions. For example, top speed and cruising speed fall within 10 to 15 per cent of each other with a resulting lack of flexibility of speed or fuel consumption of the jet airplane. One of the promising new solutions to this problem (in addition to tail-pipe afterburning, alcohol-water injection, etc.), is "partial admission," a system of blocking off certain combustion chambers and operating on only the remainder. This system thereby decreases the output of the engine as well as its fuel consumption without altering the efficiency of the remaining units. Another new method now under research investigation is the use of a dual compressor-combustor system discharging into a common turbine, permitting one of the systems to be shut down in flight with resulting fuel economy and started again for needed power.

Design Matured

Outstanding engineers are bearing down heavily on the impracticality of "bigger and better" aircraft, an opinion first voiced about two decades ago but now gaining authoritative support. Wellwood Beall, Boeing vice-president-engineering, believes about 40,000 ft is the foreseeable ceiling on transport aircraft high altitude operation due to weight, complexity, operational difficulties and (most of all) costs. While he sets no limit on the possibilities of reaching and using higher altitudes, his pessimism is for extensive day-to-day operation at such heights. Arthur Raymond, Douglas vice-president-engineering, recently told the Anglo-American aeronautic conference in London that the present-size four-engined airliners are about the largest for practical airline passenger volumes and service frequencies in the foreseeable future. Again, he cites cost as the major deterrent to the design and development of larger air transports since no airline nor company could afford such a project.

All-Weather Fighter

The Curtiss XP-87 is the first in an entirely new tactical category of the Air Forces. Wartime experience proved both the need and the practicality of "all weather" fighters and the four-jet Curtiss design is capable of full combat operation in periods of reduced visibility or bad weather conditions. By radar operation of all navigation, gun sighting and aiming, the XP-87 is enabled to intercept and destroy enemy bombers regardless of atmospheric conditions. A two man crew, seated side-by-side in a pressurized canopy, is carried. More "all-weather" fighter types, notably the Northrop XP-89, are scheduled for prototype tests by the Air Forces before the year is out.

Swept Wing Fighter

The North American XP-86 is designed to explore the tactical (as distinguished from pure research) possibilities of swept wing high-speed fighters. The tiny craft is basically a modification of the Navy XFJ-1 by the same company but the fuselage of the Army version has been increased to accommodate the swept wing effects on stability. The six-ton single-seater is powered by a GE-Allison J-35 turbojet engine with a continuous air intake from the nose to the compressor. Armament includes six .50 caliber machine guns and a variety of wing loaded rockets, bombs and smoke tanks. Air Forces plan extensive tactical tests of the two prototype airplanes to determine the possibilities and limitations of swept-wing fighters as tactical types. The program will take place at Muroc Army Air Base, Calif. No procurement of any of the new types is planned during the fiscal year but the test time of the year will enable procurement officers to evaluate the new types in terms of service needs for fiscal 1949.

(*Turn to page* 86, *please*)

Total Registration Soars
Due to Low Scrappage

By Marcus Ainsworth

TOTAL registration of motor vehicles is soaring to unprecedented heights. In 1946, after nearly four years of absolutely no passenger car production, total registration of motor vehicles amounted to 33½ million, the highest of any year in the history of automobiles with the exception of 1941 when 34,152,000 were registered. With continued high production, and low scrappage of automobiles now in use, it is predicted that total registrations for 1947 will exceed those of the peak year 1941 by some 2,248,000 and will total approximately 36,400,000. Passenger car registrations which will number nearly 30,200,000, will be nearly one million over the 1941 peak of 29,240,000, and trucks and buses will approximate 6,200,000 or 1,288,000 more than 1941.

The Public Roads Administration has just completed an estimate of registrations as of the end of 1947 which is slightly higher than this figure. According to their data total motor vehicle registrations will be 37,164,405 of which passenger cars will number 30,545,000 and 6,619,405 will be trucks and buses.

While it is a hazardous undertaking to estimate registrations for 1948 due to the extremely unstable economic conditions throughout the country, it is predicted that there will be further increases during the coming year 1948 to what is believed will be a maximum of around 38,800,000 of which approximately 32,000,000 will be cars and 6,800,000 trucks and buses. In a few years after 1948 the registration curve will in all probability flatten out and stabilize in the neighborhood of slightly over 39,000,000 vehicles, unless the country is plunged into a major depression.

The slight losses in registrations during the war and their substantial increases since the end of the war can be attributed to only one factor—subnormal scrappage. During the years 1927-1931 the annual average scrappage of motor vehicles amounted to around 2,700,000, while in the depression years of 1932-1936 this was reduced to 2,100,000 vehicles. As conditions began to improve in the years 1937-1941, the average annual scrappage increased to 2,350,000 but from then on the picture changes materially.

It is a misnomer to speak of scrappage alone during the years 1942, 1943, 1944 and 1945. It is true that there was some scrappage during those years, but the reduction in registrations can largely be attributed to vehicles withdrawn from service and put in storage for better days, rather than to junking. During 1941 vehicles scrapped amounted to 2,100,000.

Total U. S. Motor Vehicle Registrations

	Passenger Cars	Trucks and Buses	Total Motor Vehicles
1939....	26,147,798	4,496,770	30,644,568
1940....	27,240,475	4,683,376	31,923,851
1941....	29,240,417	4,911,990	34,152,407
1942....	27,683,529	4,741,298	32,424,827
1943....	25,841,215	4,657,882	30,499,097
1944....	25,298,639	4,611,966	29,910,605
1945....	25,398,824	5,025,233	30,424,057
1946....	27,728,889	5,801,541	33,530,430
1947*...	30,200,000	6,200,000	36,400,000
1948*...	32,000,000	6,800,000	38,800,000

* Estimated.

In 1942 vehicles scrapped and withdrawn from service numbered around 2,147,000. During 1943 this figure was about 1,485,000, and in 1944 only 775,000. In 1945 the gears shifted into reverse and, instead of scrappage, there was actually a gain in vehicles of 90,600. This was indicated by the excess of total registrations at the end of 1945 over those of 1944 plus the new vehicles which went into the market during the year. This excess could mean only one thing—that vehicles withdrawn from service during 1942 and 1943 were brought back into service with the end of wartime restrictions. Again in 1946 there was a gain in vehicles which amounted to 666,000. More cars, trucks and buses had been brought out of storage and returned to active use. While it is known that there was some scrappage during the two years 1945 and 1946, it is impossible to determine the amount; but it is estimated that the figure was under 500,000 for both years. It is assumed that all of those cars, trucks and buses which were taken off the road in 1942 and 1943 have, by this time, found their way back into active service. However, it is believed that scrappage during 1947 will continue at a low ebb, possibly around one million vehicles, and in 1948 approximately 1½ million, and will not show any marked increase until such time as production has reached the point when one can buy a car or truck at will. With today's high prices of new cars and trucks it is much more economical

(*Turn to page* 68, *please*)

What Builders of Small Vehicles Are Doing

WITH an eye on a lucrative automobile market, both foreign and domestic, a number of manufacturers are producing, or expect to produce soon, small vehicles in a variety of sizes and styles. Most of these small-vehicles builders are newcomers to the automobile industry, with the principal exception of Crosley, a prewar car manufacturer.

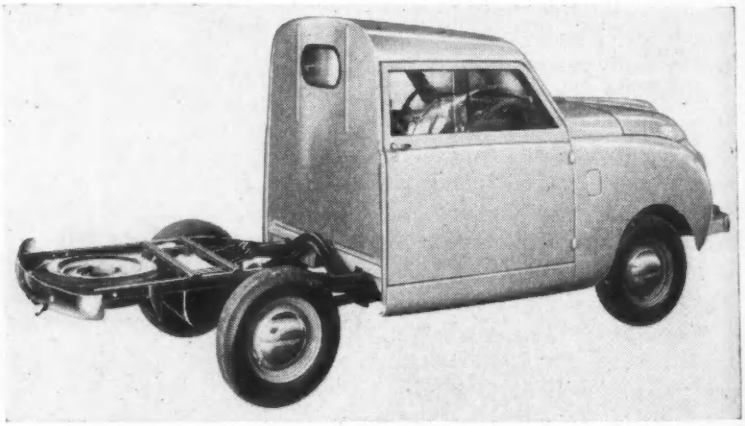
Some of these small vehicles may be classed as midgets, while the others may properly be called light cars. The trend in the midget class seems to be toward three-wheel models with a preponderant number having the odd wheel at the front, and powered by aircooled engines of 10 hp or less. The light cars, heavier than midgets, are of more conventional design with four wheels, and are powered by water-cooled engines over 25 hp. Prices of the midgets vary from approximately $200 to $640, while prices of the new light-car models range from $800 to $1,100. One manufacturer of a three-wheel midget, has planned to ship distributors a complete car knocked-down with the parts packed in one box and to be assembled by the distributor or by the buyer.

Available information on the small vehicles being produced is summarized as follows:

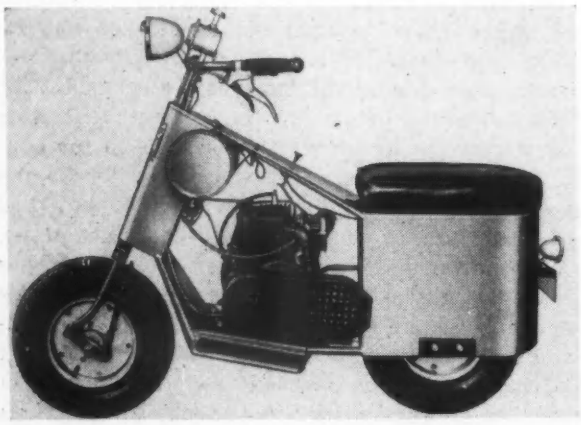
Crosley Output Higher

SINCE the beginning month of postwar production in June, 1946, Crosley output has risen from 164 cars a month to approximately 100 cars a day in September, 1947. The total output to September 20 was 18,248 passenger cars and 2348 commercial units. New prices, fob Marion, Ind., effective since Aug. 12 are: sedan, $888; pick-up truck, $839; convertible, $949. In addition Crosley recently announced a cab and chassis model for mounting a special body for light delivery or display service. Its price is $819 fob Marion.

Descriptions of the new Crosley engine and the production facilities for manufacturing the car were published in the Jan. 15, 1946, and May 15, 1947, issues of AUTOMOTIVE INDUSTRIES.



Crosley's new cab and chassis model, priced at $819. Curb weight is 1150 lb, wheelbase 80 in.; overall length 145 in.; and back of cab dimensions—to centerline rear axle 18¼ in.; to end of frame 46½ in.; and to rear of bumper 59¼ in.

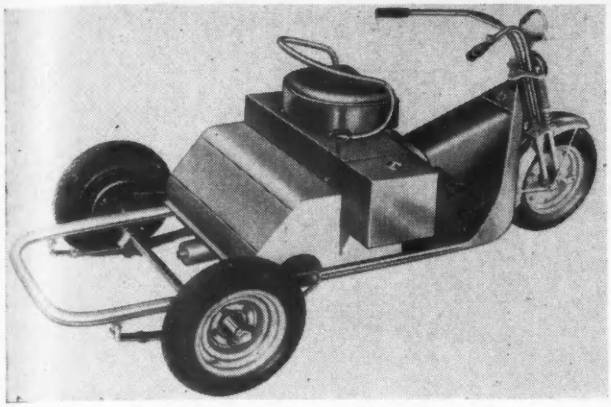


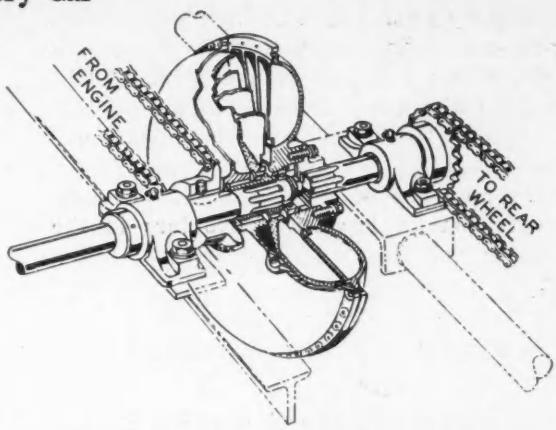
This two-wheel scooter, the Brogan-Cycle, is powered by a 1½ hp engine.

Brogan-Cycle

A TWO-WHEEL scooter, the Brogan-Cycle, powered by a 1½-hp aircooled gasoline engine, retailing for $199 plus tax, is in production at the B&B Specialty Co., Rossmoyne, Ohio. The company is reported to be in the course of developing three and four-wheel vehicles to be powered by 10-hp aircooled engines. The models will include a truck type, closed and open; a combination truck-passenger car; and a modified commercial two-seater. The three and four-wheelers are expected to retail for between $600 and $700. The present objective of B&B is nine models in the ranges of two, three and four-wheelers and 1½ to 10-hp engines. The B&B Specialty Co. plans to retail its vehicles through automobile agencies as dealers.

Firebaugh Delivery Car





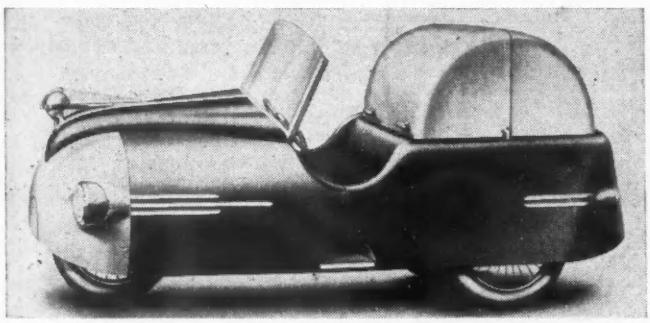
The Firebaugh truck, the chassis of which is shown in the photo to the left, is furnished with a welded steel open body, Power transmission, illustrated by cut-away drawing, is by means of sprockets and a rolled chain through two hydraulic couplings, and thence by sprockets and chains to the rear wheels. Both rear wheels are individually driven.

FIREBAUGH MOTORS, INC., of San Diego, Cal., is reported to be producing a three-wheel welded-steel open-body type light delivery truck at the rate of 600 a month. This model has an overall length of 103 in., overall width of 52 in., overall height of 36 in., a wheelbase of 72 in., tread of 43 in. and weighs empty approximately 700 lb. It has a body capacity of 23 cu ft and will carry a one-half ton load.

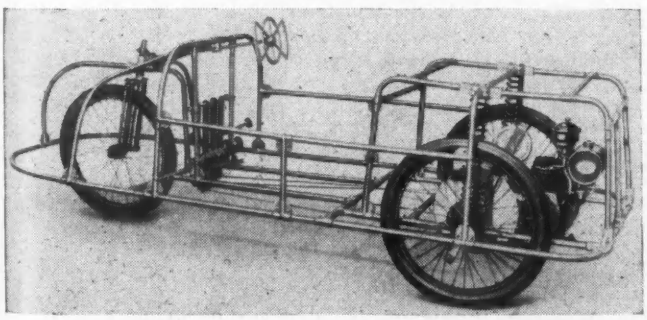
The power unit is Firebaugh model 10, a two-cylinder, opposed, four-stroke, valve-in-head, aircooled engine, supplied with either magneto or distributor and coil ignition. With a bore of 2.6 in. and stroke of 2.25 in., the piston displacement is 23.84 cu in., and the delivered power is 8½ hp at 3600 rpm. A 30-plate oil-bath double-clutch is fully enclosed in the crankcase. The necessity for both a transmission and differential mechanism is eliminated through the use of hydraulic couplings which operate on the Vulcan-Sinclair principle. Power is transmitted from the engine to an intermediate shaft by means of sprockets and a roller chain, then through two hydraulic couplings and thence by sprockets and chains to the rear wheels.

A report states that the one model being produced at present is to be supplemented by two others: one with a panel-type body, and another with a station wagon body, both of which should be in production within 90 days. The price of the present box-type is $640 fob San Diego, Cal. The panel and station wagon models have not been priced definitely, but are expected to run around $775.

Norman T. Firebaugh, president of the firm, states that applications to purchase the trucks have been received from many countries and that dealerships have been established in more than 20 states and in six foreign countries. Production is to be stepped up to 1000 a month by next January at San Diego.



This Comet car, designed by the General Developing Co., weighs 175 lb and is reported to make 100 mpg. The storage trunk can be removed.



View of the Comet chassis and its tubular frame construction.

Comet and Marvel Cars

THE General Developing Co. of Ridgewood, N. Y., plans to have three vehicles in the lightweight field—the Comet convertible, the Marvel delivery car, and the Featherlite motor-wheel. The three-wheel Comet is designed as a three-seater, weighs 175 lb and is powered by a 4½-hp rear-mounted engine equipped with a remote foot-starter device. The chassis is tubular frame throughout. The car will be shipped knocked-down to distributors with all parts in a box 60 by 30 by 30 in. The complete assembly is said to take about two hours. The plastic body is tinted in various colors. The overall length and width of this car are 114 in. and 48 in. respectively; carrying capacity is 500 lb. Tires are 2.5-26 in.

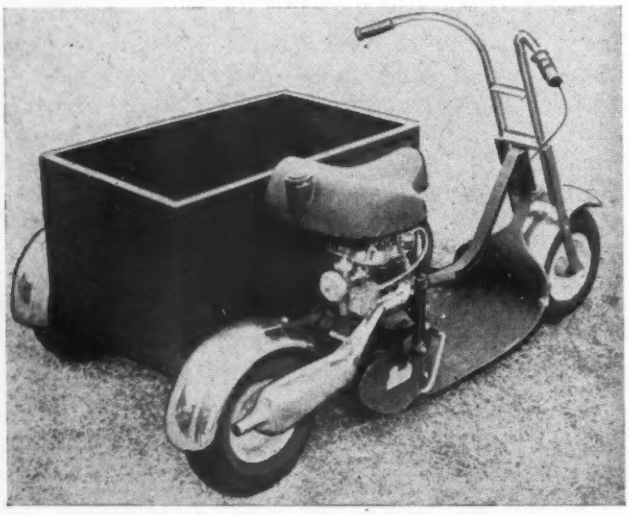
Production of the Comet car is expected to begin in about a month. Wholesale price to the distributor is reported to be $240 and the distributor's selling price $320 knocked-down, plus 15 per cent for assembly charge at the option of the buyer, who can purchase the car knocked-down. Besides distributors in this country, the company states that license and royalty agreements have been made with distributors in eight foreign countries.

The Marvel delivery car is a three-wheel model, designed to carry a half ton in a body equipped with an over-the-top sliding door. Overall dimensions are: length, 57 in.; width, 54 in.; height, 42 in. The car is equipped with a cone drive and a dual opposed-cylinder engine. Distributors will buy parts and either assemble them themselves or have them assembled. The retail price will be $600. The company reports that it has 10 distributors in the United States and distributors in eight foreign countries.

(Right) General Developing Company's Marvel

Powell Motor Scooter

THE Powell Manufacturing Co., Compton, Cal., has introduced a small three-wheel vehicle, the model P-48. This is driven by a seven-hp one-cylinder engine of 24 cu in. displacement at a reported cruising speed of 40 mph. The engine has a 3 1/16-in. bore and 3¼-in. stroke. Overall length of the Powell P-48 is 68 in., with a wheelbase of 48 in. No price has been determined as yet.



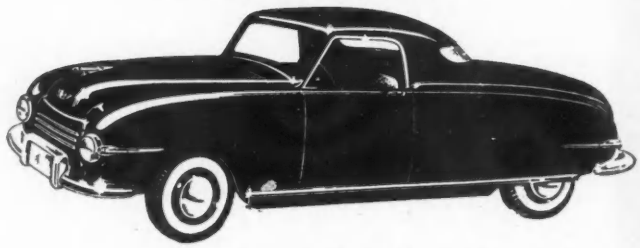
The Powell P-48 motor scooter. This vehicle is powered with a seven-hp engine.

Cushman Scooter

A THREE-WHEEL delivery vehicle, the Package Kar, is being manufactured by the Cushman Motor Works, Inc., at the rate of about 35 per day. This machine, a delivery model of the Cushman Scooter, sells for approximately $385 fob (including Federal tax), and is also available with a stake-type front body for delivering light and bulky merchandise. The manufacturer also states that the Package Kar can be used for transportation purposes when a specially designed seat is placed across the front. Features of this vehicle include an automatic clutch, a new sliding gear transmission with two forward and one reverse speeds, three-wheel brakes and knee-action front wheels. It is powered with a four-hp one-cylinder engine. Tire size is 6.00 by 6. Capacity of the box is given as eight cu ft, and load capacity as 300 lb plus driver.

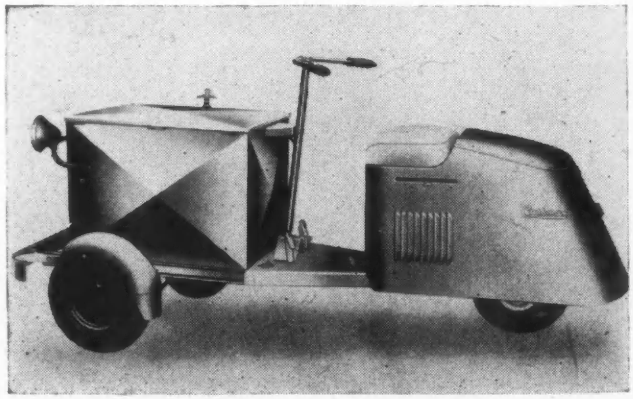
(*Turn to page* 70, *please*)

1948 Playboy Model



Drawing of the 1948 Playboy.

FIRST car of the newly designed model 1948 Playboy came off the assembly line of the Playboy Motor Car Corp. the middle of August at its plant in Buffalo, N. Y. It is being built only in one body type—a convertible coupe with an all-metal top. The previously announced model had a fabric top, rear engine and auto-o-matic drive with no clutch pedal and no gear shifting. This new model is powered by a Continental L-head, four-cylinder, 40-hp, water-cooled engine mounted at the front of the chassis. The transmission is a standard three-speed and reverse type with overdrive as an option at extra cost. A specially designed rigid axle with single-arm independent suspension is used at the front, while a conventional type semi-floating axle with a 4.1 to 1 ratio is used on the rear. Some general dimensions are: wheelbase 90 in., tread 47 in., overall length 155 in., overall width 59 in., height 56 in., seat width 50 in., ground clearance 8.5 in. Curb weight is 2035 lb. Officials of the company have no definite plans as to the number of cars that will be produced for the next year. The price is set at $985 fob Buffalo, N. Y.



The Cushman Package Kar

Observations

by Joseph Geschelin

inetic nergy

SINCE the brake an energy absorbing device, Bendix gineers are accumulating design data prove that brake size as well as the act relationship between front and ar brakes is a function of an empirical work factor." Approaching the prob- m from the standpoint of kinetic ergy, Bendix has found that present ake linings have a limiting value of work factor" of about 1000 psi. The st value seems to lie between 900 and 00 psi with the lower value giving eater lining life. Analysis of pas- nger car brakes on this basis provides better engineering basis for the rela- e size of fronts and rears, distributes eir work more equitably. When the turns are in, this project should mark important step forward in modern ake design.

48 Models

EARLIER estimates dicated that several makes of pas- nger cars would announce about this me. Recently, however, one of the anufacturers told us that the '48 odels are now set for introduction out December one. That implies pret- definitely that the center of gravity announcements may not be expected ntil the Spring months of '48.

utomatic hifting

WHILE it is certain at automatic transmissions will pre- minate soon, it is not as certain that e present picture will change much on rly '48 models. One of the highest riced cars intends to have an automatic ansmission and is working on the job w. But it is doubtful whether the it will be ready in time for the early 8 production run. Another make has veloped an automatic transmission— ssibly of torque converter type—but is will be made available only as an tion on higher priced models. By the ks of things, it's the '49 models that ould show the greatest change to auto- aticity.

Waste Disposal

WE learn that one of the big headaches facing many plants is how to dispose of industrial waste, particularly discarded cutting oils. Since disposal of oily waste materials is prohibited by sanitation authorities, it is not feasible to dump them into sewage systems without treatment. We have found since that relatively simple means exist for the treatment of these wastes to break down the oil. It would be interesting to find out how some of our readers are meeting this problem.

Lower Pressure

ACCORDING to engineers the new low pressure type tires will be standard in the industry in a relatively short time. Incidentally these tires will contain a high percentage of natural rubber with a consequent lift to endurance and safety. Incidence of these tires brings up a serious point with respect to new body jobs introduced before the new tires are adopted. Adoption later on may require serious changes in the fender or quarter panel dies to accommodate the larger cross-section.

Body Repairs

WITH the growing swing to fenders integral with quarter panel stampings, there is some concern as to what is involved when a fender is ripped beyond repair. Packard has had experience with its Clipper models and finds the problem to be quite simple to handle. They have found it feasible to supply dealers with fender sections of various sizes cut from rejected quarter panels. The bump shop, which by the way is said to be quite skilled these days, cuts out the torn section, fits a section of a new stamping to suit the opening, welds or brazes in place, smooths with solder, and finishes. Cost is said to be comparable with a complete fender replacement on conventional cars.

Wire Cord Tires

THE constant search for improvement has lead some of the major tire companies to enter into the manufacture of the heavy duty wire cord tire for trucks. At the present writing output is small compared to regular truck tire production. The steel wire cord tire is an outgrowth of French practice before the war, as we understand it. One of the major producers tells us that a great deal of development still remains to be done if this type of tire is to have wider acceptance. In the first place experience has shown (in the case of this company) that the lower the inflation pressure the more susceptible the tire is to injuries which bend or kink the wire. French tires are of high pressure type which doubtless accounts for their success. Because of the requirement of high inflation pressure the wire cord tire is not practical at all for off-the-highway service and has a reduced life in normal road service. At the present writing, therefore, our correspondent concludes that the wire tire is far too expensive save for very specialized operations. The goal to which the engineers are working is improved economy either through lower cost of increased life, preferably a combinations of both.

Bonded Lining

CONTACTS around the industry indicate that many organizations have been working on the development of bonded brake linings, using a suitable plastic adhesive instead of rivets. At the moment Chrysler appears to be first vehicle producer to announce the use of this process on some models as standard practice. We gather from other experimenters that the selection of the proper adhesive is a factor of major importance. For example, some adhesives result in an unpleasant brake noise while others may not give sufficient bond strength. The problem is to get the proper balance of wanted characteristics. Nevertheless, it seems inescapable that rivets are on the way out, in the opinion of the experts.

Plastic Guards

A MINOR development of interest to plant management is the use of transparent plastic shields as safety guards on small machines. They are of particular value on small punch presses, light drilling and tapping machines, and small automatics where the major hazard is that of flying chips. Unique virtue of such guards lies in the fact that both work and tooling can be plainly observed without endangering the operator.

Engineering Library

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 58.

E-179—New Line of Internal Grinders

The Heald Machine Co., Worcester 6, Mass., just recently introduced a new line of internal grinders, including Gage-Matic, Size-Matic, combination and plain internals, and centerless internals. They feature centralized controls, great structural rigidity, and smooth, uniform table and wheel feeds. Setting-up is simplified by a new feed mechanism with fingertip dial adjustments, and quickly adjusted, self-locking reverse dogs. All moving parts are either permanently lubricated and sealed, or automatically lubricated by controlled pressure. Periodic motor greasing is the only manual lubrication necessary for entire machines.

Other features of the new Heald internal grinders are:

High frequency wheelheads are available, capable of running at very high speeds and taking heavy cuts.

The new feed mechanism is arranged so that the roughing and finishing rates of feed and the amount of roughing and finishing feeds as well as the amount of retraction, compensation and rapid approach are set by turning conveniently located and graduated knobs on the feed box.

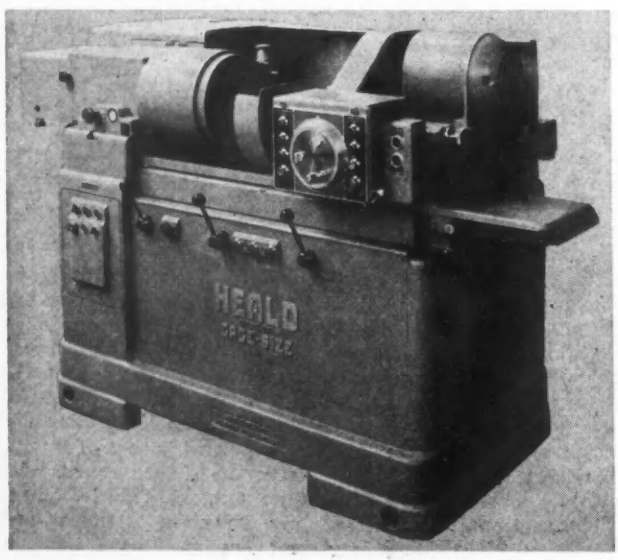
Protected anti-friction ways give maximum rigidity to the cross slide and freedom from cramping and sticking, and insure accurate feeds.

An indicator shows when the belt tension is correct for the size of wheelhead used, avoiding excessive tension and insuring long life for wheelheads and belts.

A new compact sealed wheel truing unit permits short wheel spindles and is free from external pressure which might disturb its accuracy.

The diamond can be cooled by a jet of cutting fluid while truing.

Table dogs are enclosed while the machine is operating and are adjustable without tools.



Heald internal grinder

E-180—Electric Contouring Device

A new electric contouring device which is reported to duplicate work accurately, automatically, and quickly, and which can be installed on any LeBlond Regal lathe in 10 minutes time is announced by the R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio.

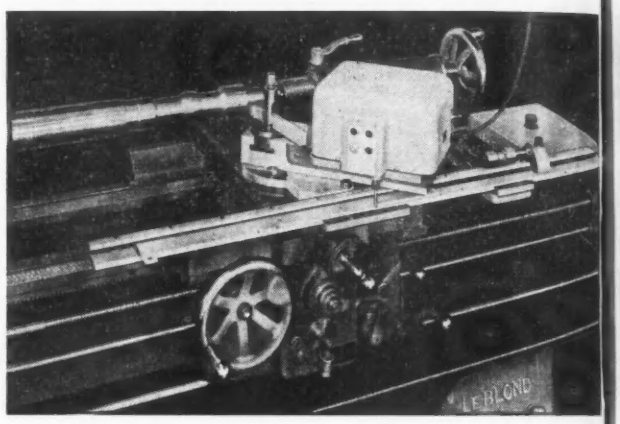
The new device can be plugged into a light socket, and will perform accurately within .0015 in. to .002 in. the complete range of duplicating operations, such as straight facing and turning, tapers of any kind, shoulders, necking, concave and convex surfaces and spherical surfaces. It is readily adaptable to duplicating work between centers or profile facing.

With the duplicator slide which swivels on either side of cross slide center line, the tool may be fed either toward headstock or tailstock, a feature said to be available only on this contouring device.

Constant distance between tool and template is maintained because the template bar is a part of the tool slide and moves in and out with it. The diameter is thus controlled by the regular cross feed screw—another feature which is believed to be exclusive with the LeBlond contouring device.

Three electric push buttons for in, out, and automatic cycle simplify operation.

Since the LeBlond duplicator may be quickly installed or removed, it does not interfere with the normal operation of the lathe. In addition, the slide on which the duplicator is mounted is interchangeable with the standard Regal top slide. No machining, drilling, or fitting is required.



LeBlond electric contouring device

E-181—A-C Arc Welders

The Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis., has placed on the market a complete new line of a-c arc welders. All models are supplied with P&H "Dial-lectric" control. This simplified control eliminates the need for moving coils or cores, worm gears, sprockets and chain or lever adjustments. It is said by P&H that there isn't a moving part in the entire machine. Without cranks or plug-in stations, current selection is made by turning a single dial which requires but a three-quarter turn to cover the full welding range of the machine, from minimum to maximum capacity.

All industrial models of this new P&H series are designed for remote control. This feature is made possible by a removable control dial which provides a current amperage adjustment at the job for manual or automatic welding. Another improvement of these welders is the high-low welding range

New Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 58.

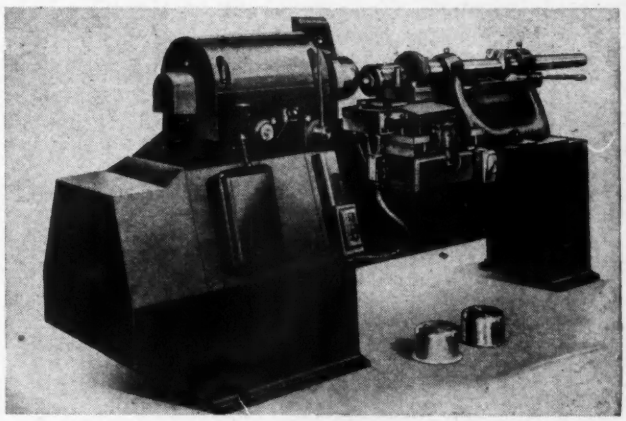
Harnischfeger T1-150 a-c welder

Indicated on the "Dial-lectric" control dial are two separate ranges, a high for general-purpose welding and another for light-gage welding. The new P&H a-c arc welders are offered in intermittent industrial and heavy-duty models, ranging up to 625 amp.

E-182—Hydraulic Cross Slide Attachment

E. W. Bliss Co. of Detroit, Mich., has designed and built an independently-operated hydraulic cross-slide attachment for second operation spinning lathes. The entire operation of the slide is arranged in an automatic cycle with push button starter for trimming, beading, curling or wire rolling operations. It is timed to enable trim cutters in the rear of the atachment to move in on the part and trim the edge. The cutters, upon completion of their work, automatically retreat allowing the beading or curling attachments their turn at the part. After the completion of their operation, the curling and beading attachments return to their original position, giving free access to the operator for shell removal and the next installation. All strokes and positions of the slide are controlled by adjustable dogs. The power system includes speed and feed adjustment. The cross-slide attachment can be removed when desired.

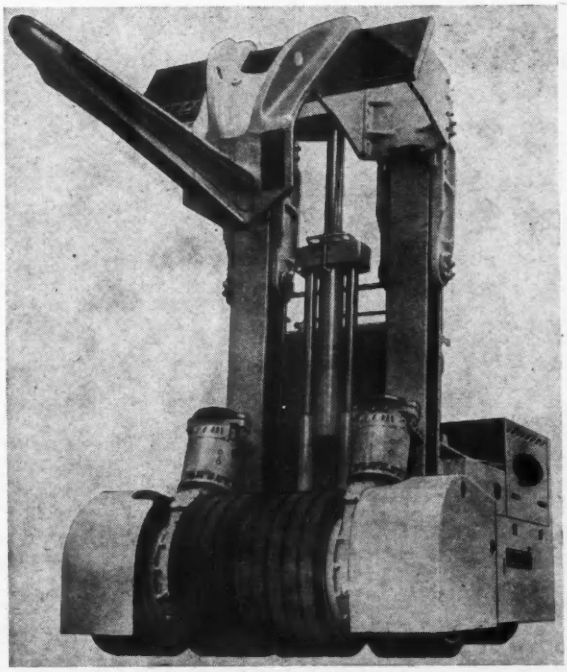
Dimensions of the Nos. 15 and 16 Bliss spinning lathes include bed lengths, 69 in. by 92 in.; chuck plate and tail plate, 18 in. by 24 in.; speeds, 275, 365, 615, 1140 rpm and 180, 370, 675, 1140 rpm. The new hydraulic cross-slide will be furnished upon request on Bliss Nos. 15 and 16 spinning lathes.



Bliss No. 16 spinning lathe with independently operated cross-slide attachment.

E-183—Skylift Giant

The world's largest fork and ram trucks — the new Skylift Giant series — are now in production at Automatic Transportation Co., 149 W. 87 St., Chicago 20, Ill. Completely new in design, these new trucks range from 10 to 30 tons in capacity. The one illustrated is a 30,000-lb unit. The Skylift Giant series trucks are powered by four-wheel front drive assembly, with twin drive units operating through fully-enclosed helical bevel and spur gear reduction for the two pairs of wheels. The Automatic Giant is said to be the only heavy-duty industrial truck with high-pressure hydraulic lift. The lift operates through a multiple-section, three-cylinder ram



E-184—Hydraulic Loading Dock

The rotary Oildraulic Leva-Dock, a product of Rotary Lift Co., Memphis 2, Tenn., is designed to facilitate the loading and unloading of material between trucks or trailers and a loading platform. The Leva-Dock is a platform which ordinarily forms part of the loading dock, and is hinged at one end so that the front end is free to move up and down with the truck bed. The platform is raised or lowered by a plunger, the head of which is connected to the platform by linkage, permitting the vertical plunger to move the platform up or down. In operation, the platform is raised by electric power unit operation to a position higher than truck bed level. The truck is then backed in and the platform permitted to lower till the supporting arms on the Leva-Dock car rest on the truck bed. As weight is rolled into the truck, the Leva-Dock platform follows the truck bed as it settles. None of the weight of the platform or load is on the plunger during this operation as the plunger automatically backs down by the process of leaving the control valve in the lowering position. In the unloading operation the Leva-Dock platform will, of course, follow the truck bed in a similar fashion. To bridge the gap between the edge of the Leva-Dock platform and the truck bed, a hinged throw-over bridge is provided.

E-185—Connecting Rod Balancer

With the exception of setting the quills for depth, operation is completely automatic on a special balance-milling machine for automotive connecting rods

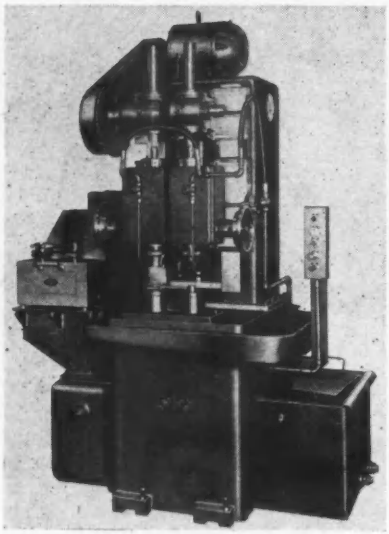
NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 58.

designed and manufactured by Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.

Parts are weighed on integral scales, depth of cut set according to pre-determined weight-depth ratio and milled in an automatic cycle with inserted-blade, high-speed steel cutters. The connecting rod is then turned over in the fixture and the cycle repeated. Cycle consists of load—rapid advance—feed—rapid return.

Two 16-second machining cycles are required for each rod, exclusive of loading and weighing. Clamping is automatic. Large cutters rotate at 55 rpm and small cutters at 110 rpm, with worm gear and spline shaft drive from a single electric motor. A 6 in. stroke is provided to permit rapid tool changes.



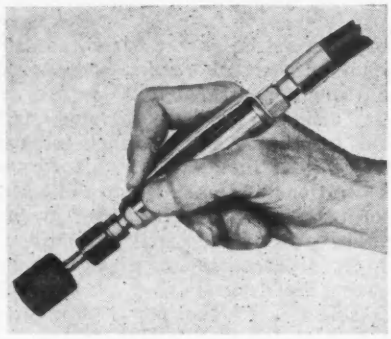
Snyder balance-milling machine for connecting rods

One 5 hp, 1800 rpm motor is required for spindle drive, and one 2 hp motor is provided for operation of the hydraulic pump. Coolant tank and pump are located at the rear of the machine. Base and column are welded steel. An oil and pressure-grease lubrication system is employed.

E-186—High-Speed Air Drill

A new high-speed air drill, Model 7022, especially designed for use on small drilling applications, is a recent development of the Aro Equipment Corp., Bryan, Ohio. The tool has a speed of 26,000 rpm, and is equipped with 0-¼ in. chuck and lever throttle.

This new model is recommended by the maker for drilling wood and non-ferrous metals such as brass, aluminum and magnesium. Also, it is said to be ideally suited for cleaning stamping dies and molds. Its high speed will clean, but is not powerful enough to remove metal; therefore, die dimensions are not affected. The tool can be applied for the same type of work in glass and plastic molding plants.



Aro Model 7022 high-speed air drill

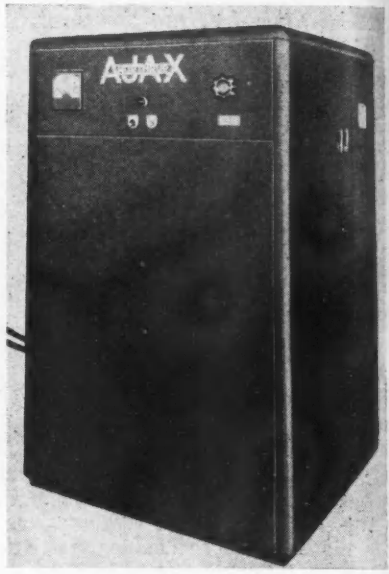
This Aro drill is particularly adaptable for multiple mounting in jigs or fixtures where more than one hole must be drilled simultaneously. Because of its small size, drills can be mounted close together. It requires a minimum of air for its high speed operation. Length, 5¼ in. Weight, 8 oz.

E-187—High Frequency Converter

A new 20-kw high frequency converter for induction heating and melting, featuring simple controls, safety interlocks, and a streamlined housing has been added to the line of the Ajax Electrothermic Corp., Ajax Pk., Trenton 5, N. J. The new converter completely incloses all parts into one semi-portable unit that measures only 44 in. by 44 in. by 58 in.

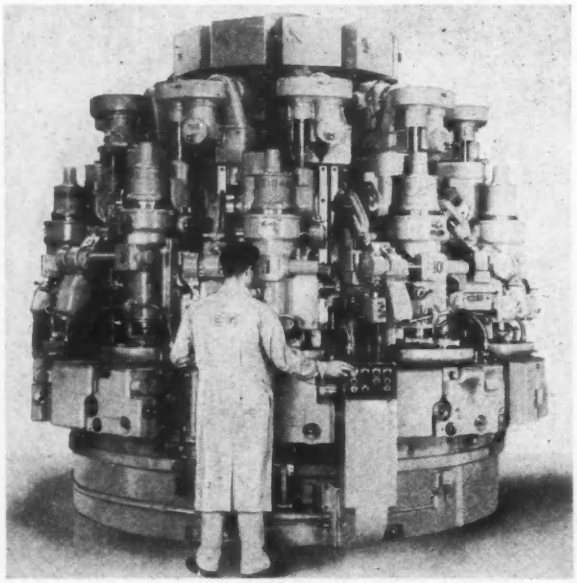
Only one control knob is needed to adjust the converter to the proper power output when connected to an Ajax-Northrup metallurgical furnace or heating coil. The electrical circuit of the converter is self-tuning, with frequencies varying from 20,000 to 80,000 cps, depending on the size and shape of the furnace coil to which it is connected. A watt meter and starting push button are also mounted on the front of the housing.

Of the spark-gap type, the new Ajax-Northrup converter has specially tipped copper electrodes in the hydrogen-atmosphere, water-cooled spark gap chamber. To safeguard against damage to capacitor, spark gap, or furnace



Ajax-Northrup 20-kw high frequency converter

E-188—Rotary Gear Shaper



This massive machine, designed and built by the Fellows Gear Shaper Co., Springfield, Vt., comprises 10 individual and complete gear-cutting units, turret mounted to rotate on a single base. The speed of rotation can be adjusted to suit any required cutting-time cycle. Each work station is independently operated by a separate motor and timing control. The machine is operated from a centralized push-button control panel located at the operator's working position. External and internal spur and helical gears, cluster gears, etc. can be handled.

It takes *GOOD MEN* to make *GOOD STEEL*

Raw materials, plant facilities, production methods . . . yes, all are essential in the making of quality steel.

But most important of all is *men*—good men. Inland's steelmen are among the country's finest. They are men who have spent their lives in steelmaking . . . men who set their standards high and drive themselves and others to meet these standards . . . men who take personal pride in the steel they produce. Such are the men who make your Inland steel—the steel you can depend upon.

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NEW Production and Plant EQUIPMENT

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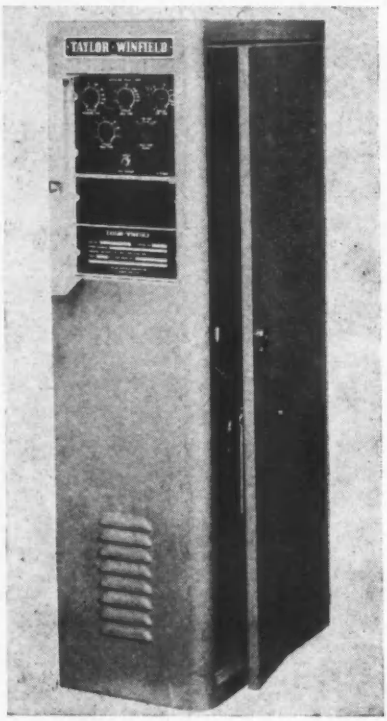
coils, an interlocked alarm bell rings if the converter is turned on when the cooling water is not flowing properly.

The new 20-kw unit is designed for steel melting up to 30 lb; for brass and bronze alloys in melts up to 60 lb, and for melting gold, silver, platinum and other precious metals. Heating applications include such jobs as brazing, hardening, soldering, etc.

E-189—Controls for Resistance Welders

The Taylor-Winfield Corp., Warren, Ohio, has brought out new non-synchronous controls for use with Taylor-Winfield welders. These controls are



Taylor-Winfield NEMA Type N2 combination non-synchronous control

designed for foot, air, motor and hydraulically operated spot, projection, butt and seam resistance welders. Accurate timing is provided by d-c timing circuits which operate on closely regulated bias and timing voltages to compensate for wide variations in power supply voltages.

Among the features of these controls are: Thermal water flow switch for protection of ignitron tubes; surge suppressor for connection across welding transformer to reduce surge voltages; circuit for "weld-no-weld" switch always operating on 110 volts regardless of line voltage; provision for cutting out squeeze timer when head firing switch or pressure switch is used; and selection of "repeat-non-repeat" operation provided as a standard feature.

E-190—Automatic Cut-Off Machine

High production and accuracy of cut lengths of pipe and tubing are said to be features of the new cut-off machines manufactured by the Pines Engineering Co., Inc., Aurora, Ill.

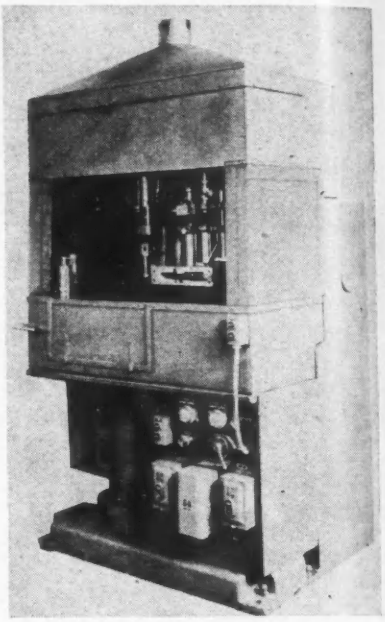
Pines cut-off machines are fully automatic. The work is fed by motor-driven rolls through a hollow spindle and against an adjustable receding target stop. A rotating head automatically cuts the work to required length producing a square face and holding end-to-end dimensions within a few thousandths inch of requirements.

Production up to 1500 pieces per hour is possible, depending on composition of the stock, wall thickness and diameter. The fast operation of this machine is due to the rapid continuous machine cycle. Once the machine is started, the operation is continuous until it runs out of stock. The time to complete an entire machine cycle is only 1½ seconds. Either parting tool bits or rotary cut-off discs may be employed depending on the job.

E-191—Vertical Spindle Hydraulic Grinder

Charles H. Besly and Co., Chicago, Ill., have recently introduced a new-type vertical spindle full hydraulic grinder. The grinder features a feed fixture into which the operator places the rough forging. The fixture then swings down into the horizontal position, advances to the grinding wheel, makes the required number of passes back and forth across the grinding wheel and, at the same time, feeds down mechanically.

Upon reaching the micrometer stop screw, work automatically recedes from the grinding wheel and returns to the unloading and loading position. The operator's normal position is between two of these machines. He takes a semi-finished forging from one machine and goes through the same operation



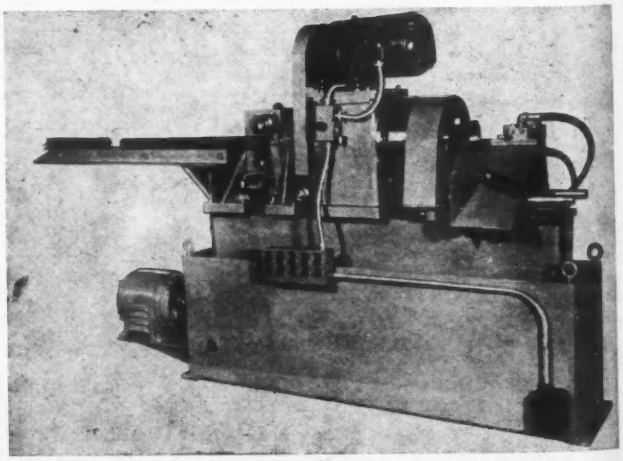
No. 320 Besly vertical spindle full hydraulic grinder

the opposite side of the forging, using the second machine.

Oil is used as a coolant. Because of the design of the machine, it is possible to control most of the mist.

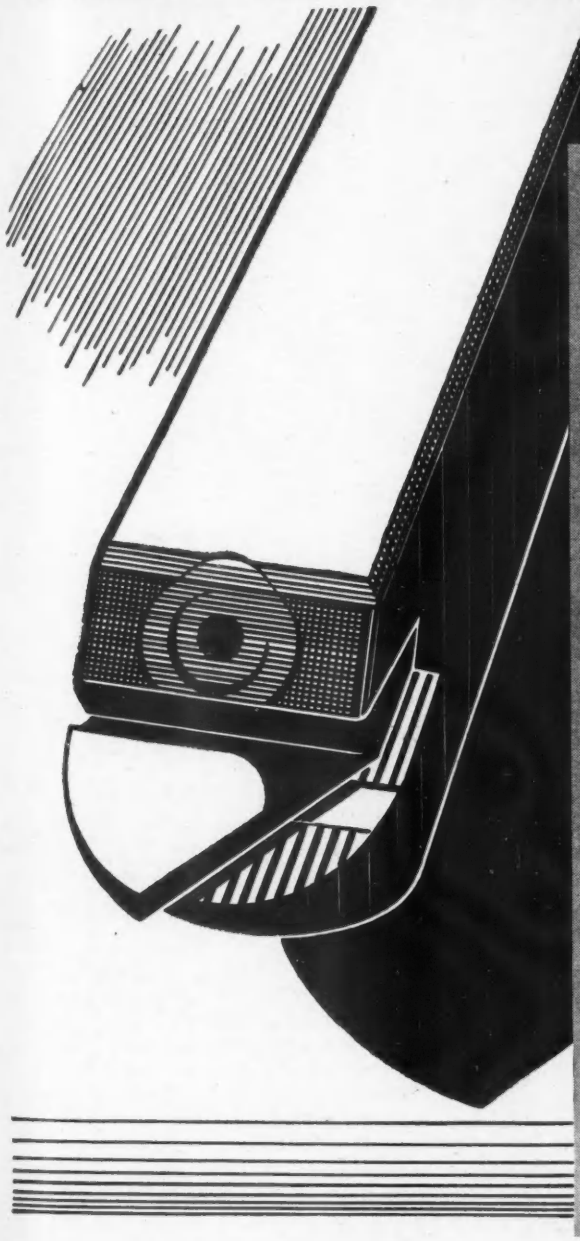
The number of passes across the face of the grinding wheel, the speed at which the work passes back and forth across the wheel, the amount of hydraulic pressure exerted and the speed of the downfeed are all subject to variation at the operator's option.

Listed as No. 320, this equipment was designed to speed the grinding of hedge shears. By changing fixtures the machine can be used on a large variety of flat surfacing including plane and combination square bodies.



Pines cut-off machine

QUIZ ON HIGH SPEED STEELS



Q. How long have molybdenum high speed steels been used successfully?

A. For about 15 years.

Q. Why are molybdenum high speed steels preferred to 18-4-1 by many large consumers of tool steels?

A. They're tougher. Do a better job for less money. They're from 10¢ to 20¢ a pound cheaper. In addition, the molybdenum steels have from 6% to 9% lower density, so if you make your own tools, you get more tools for a given gross weight.*

Q. Where are users finding molybdenum high speed tool steels superior?

A. In twist drills. In hacksaw blades. In milling, slotting, and slitting saws. In taps, chasers, broaches, reamers, hobs, milling cutters, lathe and planer tools. Can be used for all classes of high speed tools with good results.

Q. Is there any special trick needed in heat treating molybdenum high speed tool steels?

A. No. In modern furnaces, molybdenum high speed tool steels are as easy to harden properly as 18-4-1. *And* they cost much less—and *save money on the job.*

**Our booklet on molybdenum high speed steels will give you proof of these statements. Write for it.*

MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"
CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

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NEW Products

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F-113—Polishing and Coloring Compositions

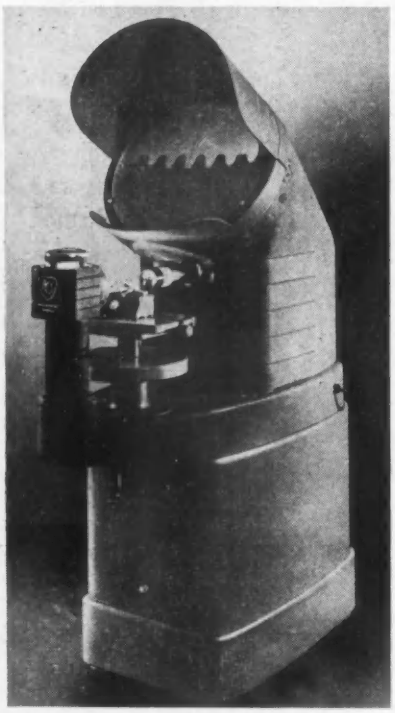
The Hanson-Van Winkle-Munning Co. of Matawan, N. J., recently brought out four grades of a new liquid tripoli composition, Acme No. 2-L-70, 2-L-75, 2-L-77, and 2-L-79.

The characteristics of the new Acme liquid polishing compositions are: grade 2-L-70—double duty with superior color; grade 2-L-75—medium cut with good color; grade 2-L-77 — good cutting with medium color; and grade 2-L-79—heavy cut with medium color.

The pressure method of feeding liquid tripoli to the wheel is preferred over the gravity feed.

Another H-VW-M development is a new liquid coloring composition for coloring nickel, brass, copper, aluminum and zinc die castings. This product is known as Acme grade 4-L-10. The maker recommends 4-L-10 for use with pressure-type composition spray equipment.

F-114—Optical Comparator



This new A O optical comparator, made by the American Optical Co., and distributed by Engineers Specialties Div. of the Universal Engraving and Colorplate Co., Buffalo 8, N. Y., is a basic instrument suitable for the production line. It can, by the addition of the micrometer stage and protractor, be converted to a measuring instrument suitable for tool and gage laboratories. Magnifications of 10X, 20X, 31.25X and 62.5X are interchangeable in quick-change bayonet mounts.

F-115—DeLuxe Sander

A new deluxe-type sander is announced by the Fruehauf Trailer Co., Detroit 32, Mich. Features of the newly streamlined unit include a protected heavy-duty solenoid valve, positive seating valve held by heavy-duty springs, and chemically treated paint inside hoppers to absorb condensation. An exclusive nozzle design assures uninterrupted flow of sand or other tractive material in front of the tires, regardless of vehicle angularity or road conditions. The sander is built for interchangeable mounting on any make tractor.

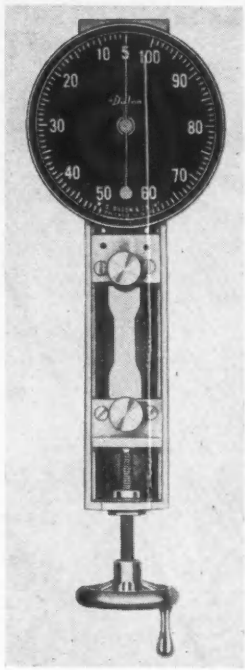
F-116—All Position Mild Steel Electrode

The improved Wilson No. 512 all-position, mild steel electrode, a recent development of Wilson Welders and Metals Co., 60 E. 42nd St., New York 17, N. Y., is designed to produce weld metal possessing not only excellent mechanical properties, but also low hydrogen content. This improved electrode has two advantages over its predecessor in that it can now be used on a-c and d-c reverse polarity current with the operating characteristics being equal. The former 512 electrode could only be used on d-c reverse. Secondly, preheating of this electrode is no longer required to obtain porosity-free weld deposits that are obtainable by using either the stringer bead or the full weave technique.

Recommended application for the improved Wilson 512 are: Welding high sulphur, free machining steels; welding hardenable steels where no preheat is used; welding cold rolled steels which normally exhibit excessive porosity when welded with conventional electrodes; and weldments to be vitreous enameled after welding. The extreme low hydrogen content of this electrode makes possible the production of satisfactorily enameled surfaces without any heat treatment prior to enameling.

F-117—Universal Tester

The new 100-lb universal tester, recently placed on the market by W. C. Dillon & Co., 5417 W. Harrison St., Chicago, Ill., handles specimens in both tensile and compression. This tester can be hand-held for operation. It will handle tensile specimens 1¾ in. wide by ⅛ in. thick, and will test rope, string, cord, fibres, and wire up to ⅛ in. in diameter. The maker states that accidental overload or shock recoil will not injure the tester.



Dillon tester

Total length of the instrument is 15 in., width is five in. across dial, height is 3⅛ in., and weight is 3¼ lb.

F-118—Aluminum Drum For Liquids

The 30-gallon all-aluminum chemical drum just developed by Reynolds Metals Co., 2000 S. Ninth St., Louisville 1, Ky., was designed specifically for shipping hydrogen peroxide. While this chemical decomposes rapidly in the presence of heavy metal salts, high purity aluminum (99.6 per cent or more) does not affect it. The Reynolds 30-gallon drum meets Interstate Commerce Commission Specifications 42D.

This drum, under most conditions, is also suitable for transporting and storing a wide range of other materials including such chemicals as glacial acetic acid, nitric acid (80 per cent and higher), benzine, ether, as well as vegetable, animal and mineral oils. However, it is considered desirable to conduct tests on individual products where application has not been previously definitely determined. These drums are also suitable for paints, enamels, lacquers and varnishes under most conditions.

The Reynolds 30-gallon aluminum drum weighs 34 lb, compared with 65-70 for a steel drum of comparable strength. It is 30½ in. high, 18 in. outside diameter, not including reinforcing rings, which are 1½ in. high, adding 3 in. to make the total overall diameter 21 in.

Chemical Tools!

3 TYPES... EACH BEST FOR CERTAIN ASSEMBLIES

Just as you have a favorite wrench that is "tops" for a certain job, each one of these chemical tools is "tops" for a particular type of assembly.

FORM-A-GASKET No. 1 (a paste) sets fast but not too fast for use on large surfaces. It dries hard but does not become brittle. It's a swell product for making pressure-tight, leak-proof unions . . . even when the surfaces are warped.

FORM-A-GASKET No. 2 (a paste) sets slower than No. 1. It dries to a tough, pliable layer with plenty of "cushion". It resists high pressures, continual vibrations and disassembles very easily.

AVIATION FORM-A-GASKET No. 3 (a brushable, self-leveling liquid) sets into position and dries to a tacky paste. It will not run, even when heated to 400° F. . . . nor will it become hard or brittle down to 70° F. below.

ALL TYPES OF FORM-A-GASKET PRESERVE ALL TYPES OF GASKETS!

PERMATEX COMPANY, INC., BROOKLYN 29, N. Y.

NEW Products for AIRCRAFT

For additional information regarding any of these items, please use coupon on page 58.

F-119—Switch Housing With Rotary Actuator

Micro Switch of Freeport, Ill., has just announced a new type of switch housing designed especially for aircraft applications. This light weight,

Switch housing model LMR, made by Micro Switch

compact die cast aluminum housing protects the enclosed switching element from dust and dirt, provides actuating means, conduit connection, and convenient mounting. The housing, catalog listing LMR, is designed to enclose Micro's Basic Switch BZ-R31 (AN3210-1) basic switching element.

The actuator is a new type of rotary-action lever arm with roller, adjustable through 360 deg. The total travel of the actuator arm is 90 deg in either direction. The 45 deg angle conduit fitting, with ¾-20 NEF-2 "AN" thread is adjustable through 360 deg and can be locked in any position.

The housing is sealed except where the actuator shaft enters the housing, however, the long actuator shaft bearing provides protection against dirt, dust, moisture, and the occasional splash of liquid. Mounting holes are symmetrical and make possible four position mounting on either face. Mounting may be done with 8-32 screws into tapped holes from the back, or with 6-32 screws through the housing and cover.

F-120—Frictionless Voltage Control

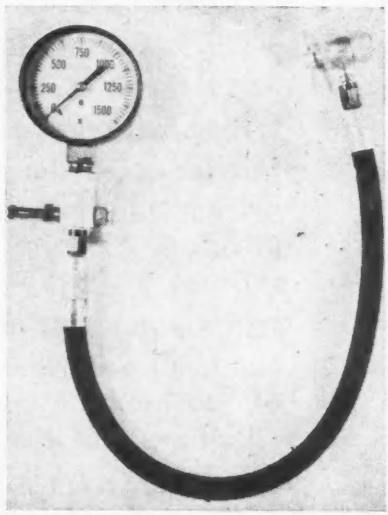
"Synchrotel," is a new electro-mechanical control device that has been developed by Square D Company's Kollsman Instrument Division, Elmhurst, N. Y. to serve as a virtually frictionless voltage control and synchronous transmitter.

This unit is an a-c synchromotor, or an electromagnetic pickoff device. According to the manufacturer, the Synchrotel can be attached directly to the pointer of the most sensitive aircraft and other instruments without affecting the accuracy of the instrument. It will convert its reading into electrical signals which can be sent to a remote station with accuracies of a fraction of a degree of arc. The signals may be used in a servomechanism to direct an airplane, control the engine temperature, operate a flight recorder, or make the airspeed adjustment in a bombsight. In like manner, in other industries it can serve both in transmitting and regulating steam pressure, temperature, flow of liquid, etc.

A feature of this synchro is that the only moving part weighs but 1/25 oz and may be mounted on tiny jeweled bearings. Thus it can be positioned by the feeble torque produced by the pointer of precision instruments.

By incorporating a Synchrotel inside the case of a conventional instrument, visible indication as well as remote control data is supplied.

F-121—Gaging Device for Shock Struts

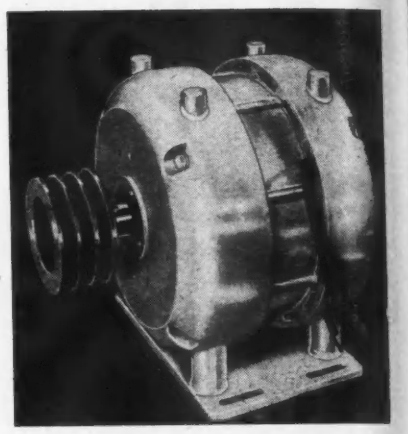


A. Schrader's Son., Division of Scoville Mfg. Co., Inc., Brooklyn, N.Y. Improved gaging device for aircraft shock struts. Certain refinements have been added to this precision-made gaging device which is now available to the entire aviation industry. The new gage has a range from 0 to 1500 psi. Through this device ground crews can safely inflate, deflate and gage pressure of landing gear cylinders and accumulators.

F-122—Permanent Magnet Generators

The Kober type premanent magnet generator is now in commercial production and is available in a wide range of sizes and types at the Kober Electric Co., Arlington, Va. Utilizing permanent magnets in a new way, shielded to avoid loss of magnetism, the new generator is free of radio interference. The elimination of exciters, slip rings, commutators, and brushes reduces maintenance cost and results in improved operation at high altitudes.

The Kober generator is said to be particularly well adapted for outboard



Kober generator

mounting on a gasoline or Diesel engine. The rotor may serve as the engine flywheel.

For applications which require control of terminal voltage, an automatic integrally mounted voltage compensator is available. This unit has no switches, contacts or moving parts and is entirely automatic in operation.

F-123—Laminated Control Pulleys

The Formica Insulation Co., Cincinnati, Ohio, has developed a new type of laminated control pulleys for aircraft uses. Its characteristics include extremely light weight in relation to strength factor and establishment of rigidity by staggering the ribs of the pulley through rib design of cantilever type.

The high-load capacity pulleys will be made in three sizes on the NAS-377 flight control series and the NAS-376 secondary control series.

F-124—Heavy Duty Aircraft Rectifier

McColpin-Christie Corp., Los Angeles, Calif., has brought out a new heavy duty six-phase aircraft rectifier.

This rectifier, designated Type E24-500T, was designed especially as a portable ground power supply for starting, testing and operating the latest large commercial airliners and jet propelled aircraft. Such airliners

(*Turn to page 74, please*)

All around the world and since way back when

Sealed Power piston rings have been giving efficient service in the engines of American passenger cars, trucks, busses, tractors and ships. Today Sealed Power factories, laboratory equipment, and staff are the finest in all our 36-year history. These facilities, and the experience gained in years of close collaboration with engine builders, are at your service today—to help make your good engines even better.

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PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

D-89—Coated Fabrics

The E. I. duPont de Nemours & Co., Fabrics Div.—A new illustrated booklet describing various types of coated fabrics engineered for upholstery has been issued. Fabrikoid, Fabrilite and Cavalon are described in the booklet.

D-90—Fiberglas Insulated

Owens-Corning Fiberglas Corp.—A recently issued 12-page booklet, Facts About Fiberglas Insulated, serves as a guide to what to look for in machine tool motors. A list is included of machine tool builders who provide Fiberglas insulated motors as standard or optional equipment on various types of machine tools.

D-91—Electric Feedrail

Feedrail Corp.—28-page Catalog No. 20 is a compilation of recent developments in the application of the Electric Feedrail distribution system as applied to portable lights and tools, moving test lines, cranes and hoists, and other industrial applications. Included in the book are diagrams for layouts, methods of mounting, sections for curves and transfer and a complete line of trolleys with self-contained meters, relays, etc. Typical applications of Feedrail as applied to production and assembly lines, work benches and many types of portable electrical equipment are included.

D-92—Radial Engine Suspension

Lord Manufacturing Co.—A new bulletin on the company's Dynafocal Radial Engine Suspension MR-26 is available. It contains, in addition to design details, specifications table, etc., a chart showing the Dynafocal suspension assembly detail.

D-93—Thread Grinding Handbook

Norton Company—Thread Grinding handbook for operators of thread grinding machines a chapter on general suggestions, shows speed conversion graphs, thread form and wheel speed tables, wheel specifications, etc.

D-94—Bronze Welding Rods

Total Metal Manufacturing Co.—Ttan bronze welding rods are described in a new 6-page folder. The approximate chemical and physical properties of seven types of welding alloys are included in table form.

D-95—Strain Gage

The Baldwin Locomotive Works, Testing Equipment Dept.—2-page bulletin No. 265, describes and illustrates the deForest Recording Scratch Gage. Construction and operation details are included, together with specifications.

D-96—Fatigue Test Machines

The Baldwin Locomotive Works, Testing Equipment Dept.—Announcement has been made of six new bulletins that describe and illustrate eight of the company's fatigue test machines. Bulletin 260, a 4-page folder includes the R. R. Moore and New Sonntag SF-10-R rotating beam types, Sonntag Universal Models SF-01-U, SF-1-U, SF-20-U and SF-4, Sonntag SF-2 and Lazan Oscillator. Bulletin 259 tells about the Sonntag SF-10-R Rotating Beam Machine. Bulletin 258, 8 pages, covers the Sonntag Universal Models SF-01-U and SF-1-U, constant load types. Bulletin 257 describes and illustrates Sonntag SF-20-U Universal Fatigue Machine. Bulletin 268, New Sonntag Model SF-4 Fatigue Machine and Bulletin 256 Sonntag Model SF-2 Fatigue Machine.

D-97—Corrosion Resisting Alloys

Driver-Harris Co.—A new 72-page catalog R-46 has been issued describing Nichrome, Chromax and Advance, together with a number of other high nickel electrical heat and corrosion resisting alloys produced by the company. The catalog provides a useful reference book for the metallurgist, engineer and designer as well as for the manufacturer employing such materials in his processes or products. Information and specifications are given covering properties, applications, etc. Weights and prices are listed in numerous instances.

(*Turn to page 78, please*)

TIME SAVER COUPON for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR new Production and Plant Equipment OR New Products items described on following pages.

Automotive Industries,
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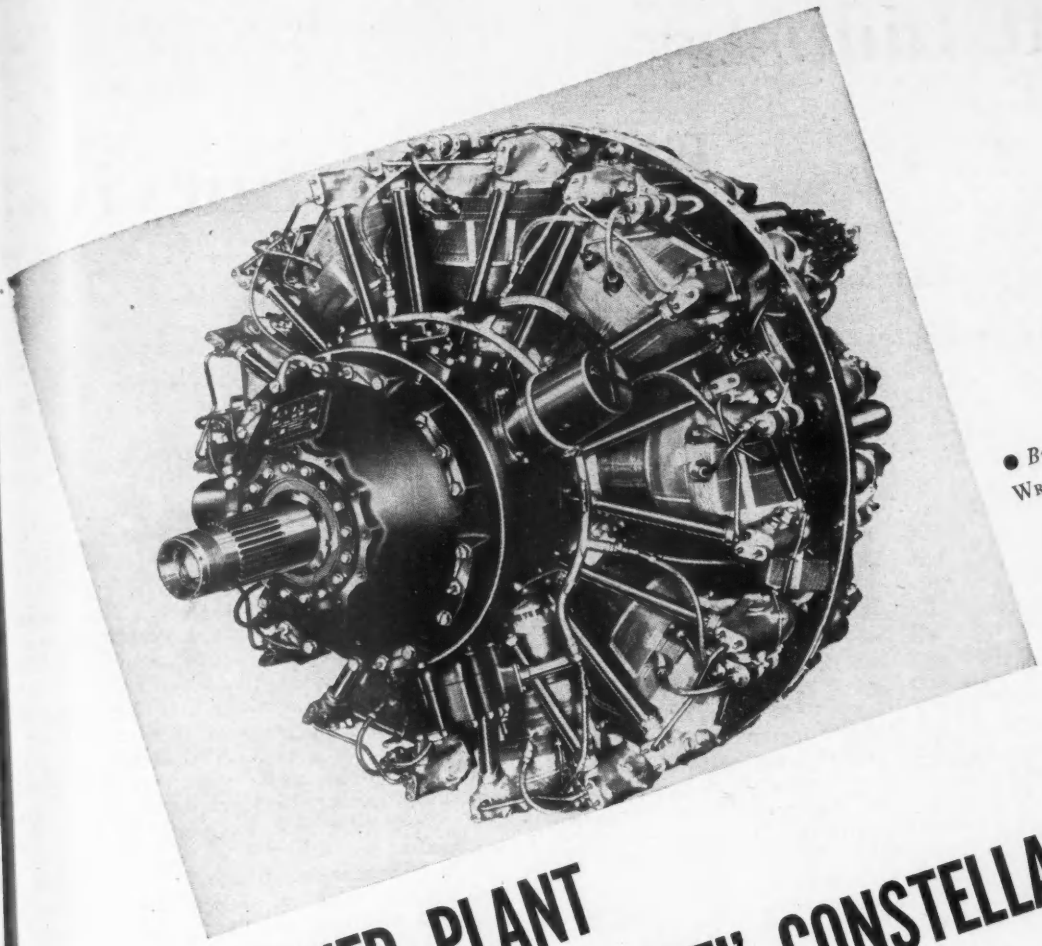

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POWER PLANT FOR "GOLD PLATE" CONSTELLATIONS

In a record time of only 34 days of certification flight testing, the Lockheed Aircraft Corporation received its airworthiness certificate for Constellation Models 649 and 749. These planes will be powered by Wright's new Cyclone 18 BD engine which, rated at 2500 h.p., has been put into quantity production. On this engine's vital rotating parts are SKF—the bearings that perform dependably at high temperatures under peak loads over long periods of flight time. When the bearings are *right*, so is the engine—so is the plane.

6306

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

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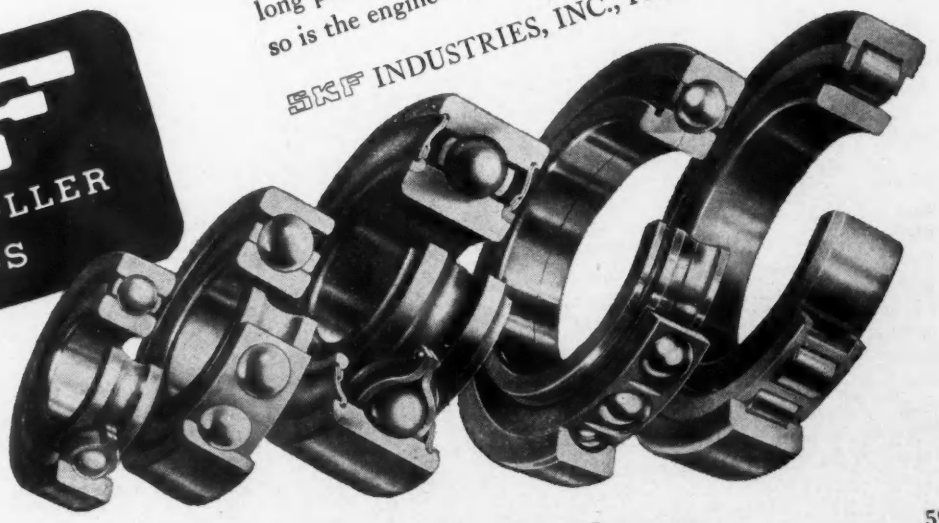
BEARINGS



Aircraft Industry Fights for Survival

Small Attendance at SAE National Aeronautical Meeting Indicates Curtailment in Aviation Development

By R. Raymond Kay

EXPERIENCING a struggle for survival, the aircraft industry is currently fighting through its second postwar year of great deficits. This means that trouble lies ahead in obtaining capital for future operations. No new postwar equity or long term financing has been offered and none appears likely in the face of continuing deficits. This view was expressed by Capt. L. D. Webb, USN (Ret.), Western Regional Manager, Aviation Industries Association, Inc., at the annual SAE National Aeronautic Meeting held in Los Angeles early this month.

A survey of nearly 3000 manufacturing corporations, made recently by the National City Bank of New York, showed an average increase of 28 per cent in net income, after taxes, in 1946 as compared with 1945. But the corresponding figure for the aircraft industry dropped 95 per cent, Webb pointed out.

The decrease in the number of aeronautical engineers now employed was evident in the comparatively small number attending the meeting. However, the 22 papers were well received and spirited discussion from the floor demonstrated the interest prevailing in engineering and research at the aircraft plants.

Attention was focused this year on power plants and transport developments. The 1946 Manly Memorial Medal was presented to C. D. Miller, Research Engineer, Battelle Institute, for his paper on high-speed photographic research on engine combustion. Abstracts of some of the most important papers will be published in a forthcoming issue of AUTOMOTIVE INDUSTRIES. Here are highlights of several of the papers.

Relative advantages of gas turbines and of compounded reciprocating engines for aircraft power plant use were the subject of much discussion. Some engineers favored compounding as productive of high-order gains in power and fuel economy; others insisted that the two or three-year job of making the compounded engine practical is a serious waste of engineering manpower which might be better devoted to turbine development.

In a paper "Engine Compounding For Power and Efficiency," E. F. Pierce and H. W. Welsh, Wright Aeronautical Corp., presented data to show that by compounding reciprocating engine and turbine, especially with the blowdown system, exhaust energy now wasted can be converted to useful work, such as creating additional crankshaft power or driving accessories. They cited performance calculations to show that power production and fuel economy can be increased 15 to 21 per cent, and significant improvements made in aircraft performance. They added that by combining blowdown and pressure recovery systems, energy now wasted could be used to increase power production nearly 60 per cent.

Opposing ideas on this subject were presented by D. Gerdan and J. M. Wetzler, Allison Division, General Motors Corp., in a paper, "The Allison V-1710 Exhaust Turbine Compounded Reciprocating Aircraft Engine." They pointed out the results of a series of experiments which, revealing serious difficulties in handling exhaust temperatures of around 1950F, indicated that the two or three years of development work required to bring the compounded engine to a practical stage might better be devoted to improving the turbopropeller engine. They said that under certain operating conditions the power output of the compounded engine showed a gain of 36 per cent and a reduction of 21 per cent in fuel consumption, yet these gains were offset by the necessity for combatting exhaust temperatures which exceeded safe-operating limits and were too high for available turbines.

Development of smaller and lighter, more compact and useful, personal planes, and of larger aircraft which are quiet, was predicted by John W. Thorp, president, Thorp Aircraft Co. He suggested the two-stroke engine and the gas turbine as logical prospects for power plants in the personal airplanes of the future. Jet propulsion has not yet justified its use in small planes, he went on, but both the gas turbine and two-cycle engine promise much in the way of weight reduction essential to the lighter and more compact aircraft.

The designer and manufacturing costs were discussed by G. W. Papen, Lockheed Aircraft Corp. Mr. Papen said the total effect of design on manufacturing cost, depending on the efficiency of the plant and the quality of the engineering, may be as much as 30 to 35 per cent of the total cost of the airplane. A reduction of this percentage may be achieved by better engineering, better design, and by closer attention to design influence on cost.

Commercial use of jet transport planes is not possible until problems of all-weather, all-plane traffic control are adequately solved. This prerequisite to jet transport development was emphasized by Warren T. Dickinson, assistant to the chief engineer, Douglas Aircraft Co., in a paper titled "Traffic Control Requirements for Jet Transport Aircraft." He pointed out that inherent characteristics of jet propelled aircraft require their operation at altitudes and speeds considerably greater than the present four engine transports.

Twenty-seven national manufacturers exhibited their products at the engineering display. Solar Aircraft Co. showed a 50 Kw gas turbine auxiliary power plant, for aircraft use, weighing 54 lb. It has nine stages and a rotational speed of 24,000 rpm.

Exhibitors included Aeroquip Corp.; Aeroproducts Division, General Motors Corp.; Kollsman Instrument Division, Square D Co.; Turco Products, Inc.; Hydro-Aire, Inc.; C-O-Two Fire Equipment Co.; Lord Manufacturing Co.; Minneapolis-Honeywell Regulator Co.; Aerojet Engineering Corp.; Scintilla Magneto Division, Bendix Aviation Corp.; Revere Corporation of America; Titeflex, Inc.; Ryan Aeronautical Co.; AiResearch Manufacturing Co.; The International Nickel Co., Inc.; Barber-Colman Co.; Thomas A. Edison, Inc.; Jack and Heintz Precision Industries, Inc.; The Cleveland Pneumatic Tool Co.; Stratos Corp.; Lear, Inc.; Vickers, Inc.; Western Gear Works; Electrical Engineering and Manufacturing Corp.; Herrmann Engineering Co.; Tison Brothers; Solar Aircraft Co.

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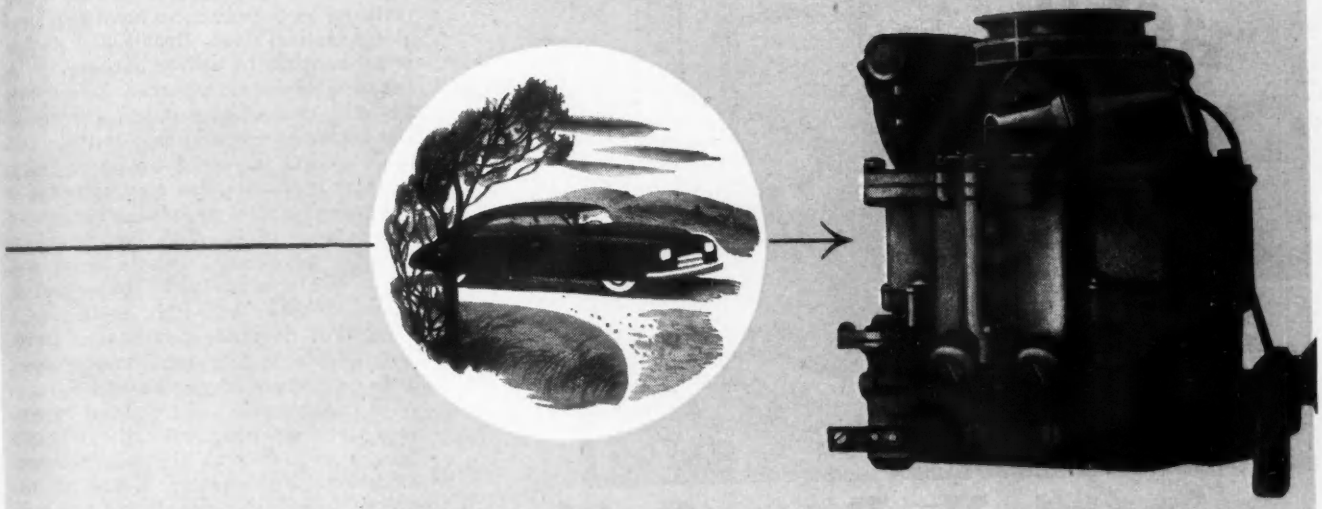

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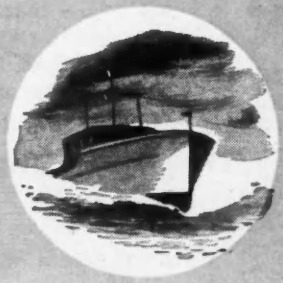


ECLIPSE MACHINE DIVISION of Bendix

ELMIRA, NEW YORK

AVIATION CORPORATION

*REG. U. S. PAT. OFF.

Latin America's Aircraft Industry

(*Continued from page* 26)

but this project was short-lived. Now the air force is experimenting with an all-wood trainer intended for aero club use. This is a low-wing monoplane with fixed landing gear and enclosed side-by-side seating. From all indications, Argentina will supply engines and other accessories under terms of the new bilateral trade agreement. Only the prototype of this plane has been flown at present, but production will undoubtedly be centered at the modern, well-equipped air force shops in Los Cerrillos.

Future Outlook in Latin America

Looking at the overall picture of the Latin American aircraft industry, there are several evident difficulties facing further industrial development:

1. Lack of a well-rounded economy.
2. Lack of domestic purchasing power.
3. Few facilities for development work.
4. Shortage of capital for expansion.
5. Foreign competition.

The lack of a well rounded economy in Latin America can be traced to the semi-feudal system introduced by early settlers. Today, these countries have only begun a modern framework of production and distribution which will permit full development of their enormous natural resources. For example, in Brazil, one of the more advanced states, 75 per cent of the working population is still engaged in agriculture, compared to about 20 per cent in the U. S. As Latin America has traditionally been a supplier of raw materials, no basic industries have developed along vertical lines. Brazil, like Mexico, is attempting to utilize her almost inexhaustible iron resources in the new $60 million steel mill at Volta Redonda. But this is merely the initial step. Most efforts to build an independent aircraft industry have only extended to the use of native woods, dopes, resins and fabrics. Most of the countries are already advanced in this field, and work will gradually be expanded to include plastics and light metals.

Lack of domestic purchasing power is traceable to the small middle class, to the extremes of wealth and poverty. With the exception of rich land owners, aero clubs are practically the only customers available to lightplane manufacturers. Fortunately, the clubs are rapidly growing in popularity and their importance should not be underestimated. Brazil has 273 clubs with nearly 700 airplanes, Argentina has 102 active clubs, and even tiny Uruguay has 1004 pilots registered in 27 clubs.

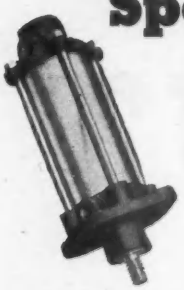
The personal plane market in Latin America is still too limited to pay for extensive development work even if facilities were available. The average yearly market in the more important countries is estimated as follows:

Brazil	500-550
Argentina	600-700
Uruguay	75
Chile	200-225
Colombia	25-50
Mexico	100-150

Since this relatively small market limits production runs to 50 or 100 units, about all that can be done is to take a proven design and add a few changes or innovations. The lack of adequate wind tunnel facilities also results in costly design changes after production has started on an original model. However, more widespread use of

(*Turn to page* 64, *please*)

Speeds Up Paper Cutting!



A NOPAK Model "D" Air Cylinder, used to operate the "hold-down" mechanism of this paper cutting machine, has increased its capacity substantially. Now, a quick flip of the NOPAK valve lever clamps and releases the stacks of paper, instantly, before and after cutting.

Slow, hand-manipulation of the screw clamp is eliminated — many more cuts-per-hour are made possible. Similar application and control of Air Power . . . with NOPAK Cylinders and Valves . . . can step-up productivity of your machines too.

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—is designed for vertical downward pushing power. Rod extension is through the mounting base. May be mounted on any horizontal flat base in which an opening can be provided.

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The ability of "A-Q" Gears to perform faithfully under even extremes of service is due:

. . . to the extremely close tolerances to which every dimension is held;

. . . to the unique developments in heat-treating that assure proper hardness and proper strength of every part;

. . . to the extraordinary control of every step in production.

"A-Q" Gears have solved many tough problems where high speed, greater efficiency, compactness, light weight and low noise level are required. They offer a new approach in design to your engineers faced with problems of increased speed or longer life.

Regardless of your requirements in quality gears, the two large plants of Foote Bros. have the facilities to produce them, backed by nearly a century of experience.

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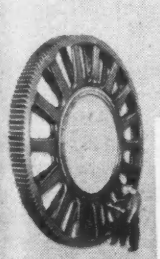
Three bulletins on Foote Bros. products are now available. They are:

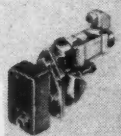
(1) *"Whatever Your Needs in Gears."*
(2) *"Aircraft Quality Gears."*
(3) *"Foote Bros. Power Units."*

Write for copies of the bulletins you desire.



The complete manufacturing facilities of Foote Bros. offer a quick, simple solution to any gear problem. Regardless of whether you need giant gears twenty feet in diameter or practically any size of helical, spur, worm or bevel gears on a production basis, Foote Bros. can serve you.

The complete Foote Bros. line includes helical gear and worm gear speed reducers in a wide range of sizes and ratios to meet practically every industrial need. Let our engineers furnish details on the type best suited to your needs.



Foote Bros. Power Units are today solving many problems in controlling linear or rotary motion from a remote point. They may be designed to fit a confined space envelope, will operate on an exact time cycle and offer the advantage of high speed where desired. Consult Foote Bros. engineers.

Latin America's Aircraft Industry

(*Continued from page* 62)

standard NACA reports plus the recent introduction of flutter and static load testing techniques are easing this situation somewhat.

While shortages of production equipment are slowly being solved, the problems are multiplied by the lack of standardization in present equipment. Much German and Czechoslovakian machinery is still in use, and, naturally, few replacement parts are available. In addition, large numbers of war-improvised drill presses, grinders, lathes and other machine tools must be replaced. Fortunately, wood structures require a minimum of expensive machinery.

Frontier Type of Financing

Latin American manufacturers are still faced with a frontier type of financing, characterized by top heavy investments in public utilities, transportation, mining and other basic industries. While the current inflation has made domestic loans easier to obtain, most governments have not yet lifted restrictions on activities of foreign investors. On top of this, government loans to industry, particularly in Uruguay, Chile and Argentina, usually entail managerial arrangements.

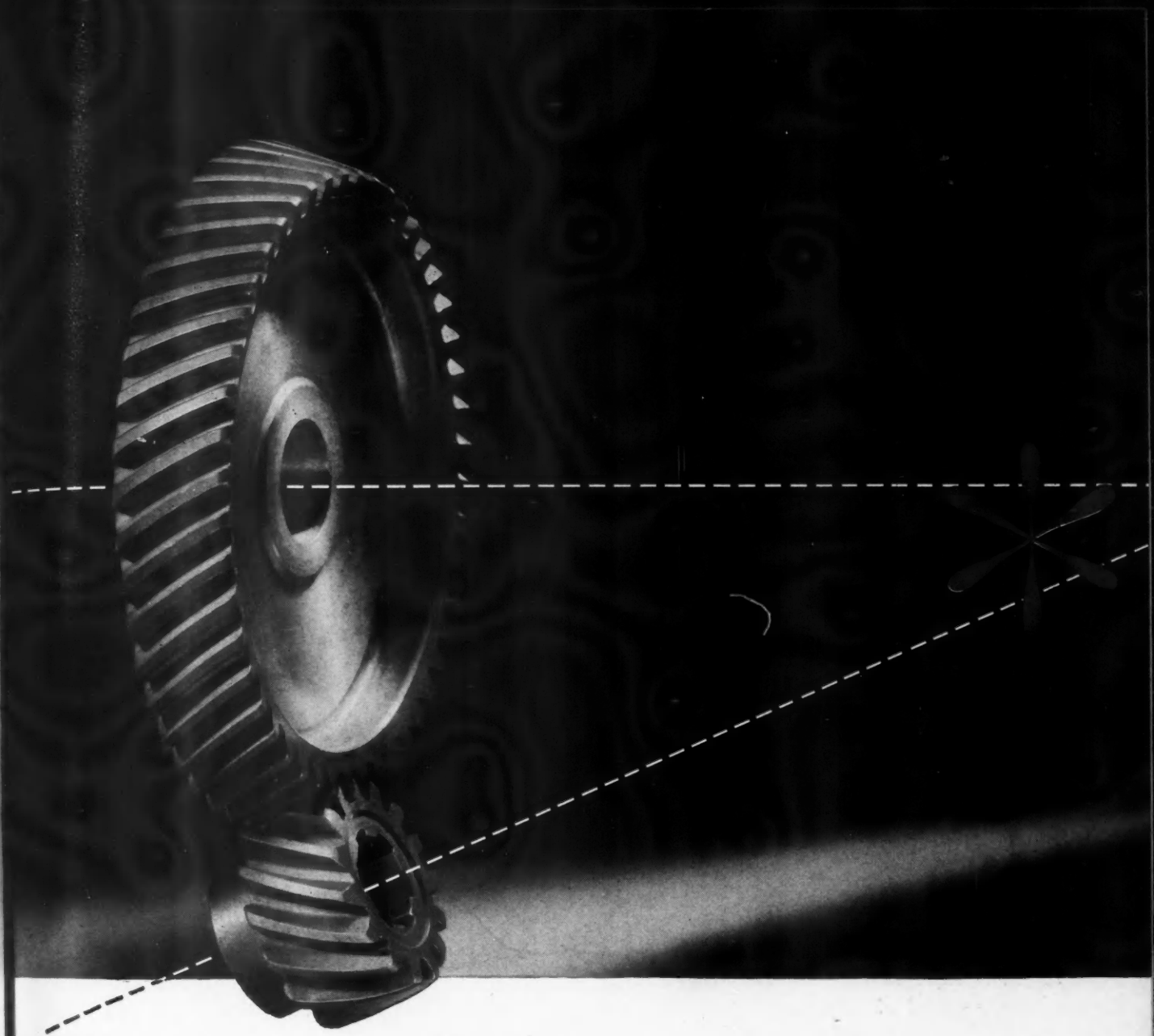
Above all, foreign competition will continue to be the greatest difficulty facing manufacturers. The United States has had the bulk of this business in the past, but the French and British are making greater inroads as local dollar reserves continue to shrink. In addition, the need for all types of aeronautical equipment has discouraged all attempts to erect a protective tariff barrier. There are several factors, however, that favor the South American plane manufacturer. Of these, cheap labor is the most important.

Where products are subject to mass production and labor costs become a small part of the total cost, it is axiomatic that the United States can dominate any free world market. While production capacity rather than price has been all-important during the last few years, American industry must depend more and more on its ability to design and produce the more advanced equipment. Obviously for the simpler designs, it will become increasingly difficult to compete with countries where capable and efficient labor is available at a fraction of the cost in the United States. At the Paulista plant in Brazil, for example, workers earn about $3 for a 10-hour day. In spite of the added cost of imported engines, instruments and steel tubing, Brazilians can buy the Paulista plane for $2,500 where a similar Piper Cub sells for about $3,600. For the same reason, Fairchild PT-19's can be constructed at Galeao for about $2,000 less than the import price of the airplane. Labor costs are similarly small in Peru, where Faucett engineers have discovered that they can profitably produce such items as screws, hydraulic fittings, oxygen regulators and even streamline tubing.

Native Technicians and Engineers Increasing

The supply of semi-skilled workers, technicians and engineers is also rapidly increasing in Latin America. Before the war, most industries were forced to employ foreign personnel in their supervisory positions since few technical schools existed, and engineering courses were almost unknown in the universities. Today the trend is

(*Turn to page* 67, *please*)



* How to lead a horse to water

OR A HUNDRED HORSES, for that matter. Gears like these are often needed to harness a marine engine to a propeller shaft, at an out-of-the-ordinary angle.

Whether or not you ever require gears of this special type, note the mark they bear: "Double Diamond." Whatever their shape, size or application, gears that carry this stamp have one thing in common: *they're made to one set of standards.* Here's how it works:

You, a builder of machinery or equipment for transportation, mining, agriculture, or manufacturing, first decide precisely what you expect from gears – load capacity, speeds, service life, quietness–and your engineers, and ours, agree on the final specifications. Then . . . from the first gear in your order to the last, *we meet or exceed those specs.* We've been doing business this way for more than 25 years.

Perhaps a meeting of minds (yours and ours) would help your product development program right now. Write.

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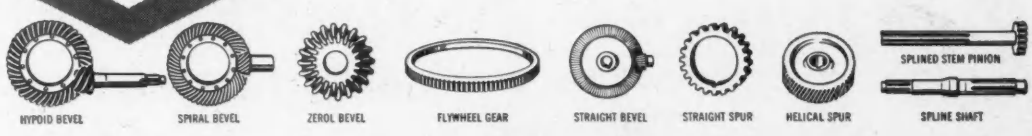

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American Rubber

B. F. Goodrich Chemical Company

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Latin America's Aircraft Industry

(*Continued from page* 64)

away from the traditionally important liberal arts, and there is new emphasis on engineering, business administration and labor legislation. Among the newer schools, the technical university in Valparaiso, Chile, is outstanding. Specialized subjects are taught by European experts, and needy students are provided with free tuition, room and board. Similar work is being carried on in Brazil at the University of Sao Paulo with the well known Dr. F. Brotero in charge of aeronautical engineering. The Escola Tecnica de Aviacao, also located in Sao Paulo, will continue to supply technicians for the aviation industry, having graduated nearly 2500 students since the beginning of the war. In Argentina, the Cordoba factory conducts its own apprentice school for boys of high school age, and over 500 of these graduates are now employed in the shops.

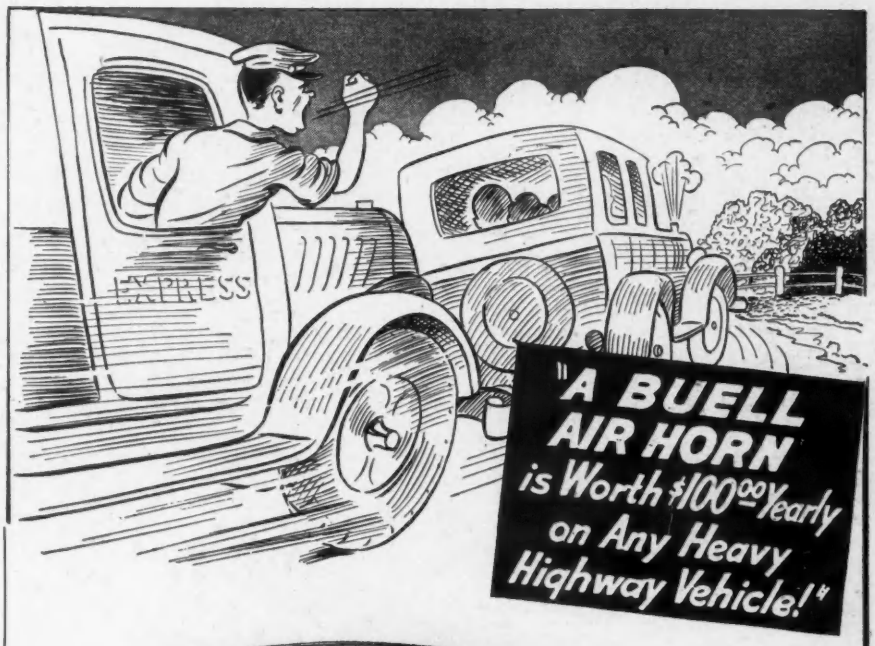
Local aircraft producers have another advantage in being able to design for a specialized market. In general, the private flyer in Latin America is unwilling to pay for such refinements as all-metal construction, retractable gear, flaps, hydraulic brakes, advanced instrumentation and sound insulation. As one pilot pointed out, "We haven't advanced enough in our travel standards to care much if a plane is drafty or noisy or even a bit slow on the controls. We are chiefly interested in reliability, utility and economy."

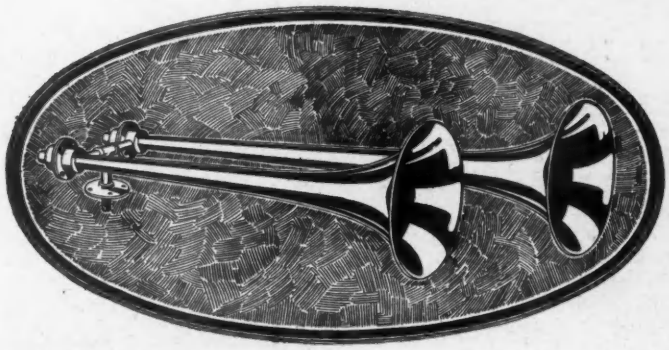
For ease of maintenance, wood, fabric and welded steel tubing utilized by local manufacturers require the least amount of equipment, and offer the greatest possibilities for improvisation in the field. Complicated accessories, particularly in the hydraulic category, are avoided for exactly opposity reasons. On larger aircraft, two-position propellers are generally acceptable, but even the fixed-pitch propellers are preferable to the constant speed varieties. Two small engines using low octane fuel are also more useful than a single high-powered engine. Top speed is secondary, of course, where ground transportation is poor, and small airports place a premium on takeoff and climbing performance. Good cruising range is extremely important where airports are few and far between.

CALENDAR

Conventions and Meetings

Natl. Conference of Industrial Hydraulics, Chicago .....Oct. 16-17
Soc. of Automotive Engineers, Production, Cleveland .....Oct. 20-21
Paris Automobile Show and SIA Meeting .....Oct. 23-Nov. 5
Amer. Soc. Tool Engineers—Semi-Annual Mtg., Boston .....Oct. 30-Nov. 1
Natl. Tool & Die Mfg. Assoc.—Annual Mtg., Phila. .....Nov. 2-5
Natl. Electrical Mfrs. Assoc., International Lighting Exposition & Conference, Chicago .....Nov. 3-7
Natl. Airport Show & Institute, Cleveland .....Nov. 4-7
Amer. Soc. of Body Engineers, Annual Tech. Convention, Detroit Nov. 5-7
Society of Automotive Engineers, Fuels, & Lubricants Mtg., Tulsa .....Nov. 6-7
Assoc. of Amer. Battery Mfgs., Annual Mtg., Chicago .....Nov. 13-15
Society of Automotive Engineers-Air Transport Mtg., Kansas City..Dec. 1-3
Amer. Soc. of Mechanical Engineers, Annual Mtg., Atlantic City....Dec. 1-5
International Aviation Mtg., El Paso, Texas .....Dec. 4-7
Automotive Service Industries Show, Chicago .....Dec. 8-13
Natl. Motor Boat Show, New York City Jan. 9-17
Soc. of Automotive Engineers Annual Mtg., Detroit .....Jan. 12-16
Natl. Materials Handling Exposition, Cleveland .....Jan. 12-16
Natl. Auto Dealers Assoc. Exhibition, Chicago .....Jan. 25-29
Chicago Production Show, Chicago Mar. 22-24

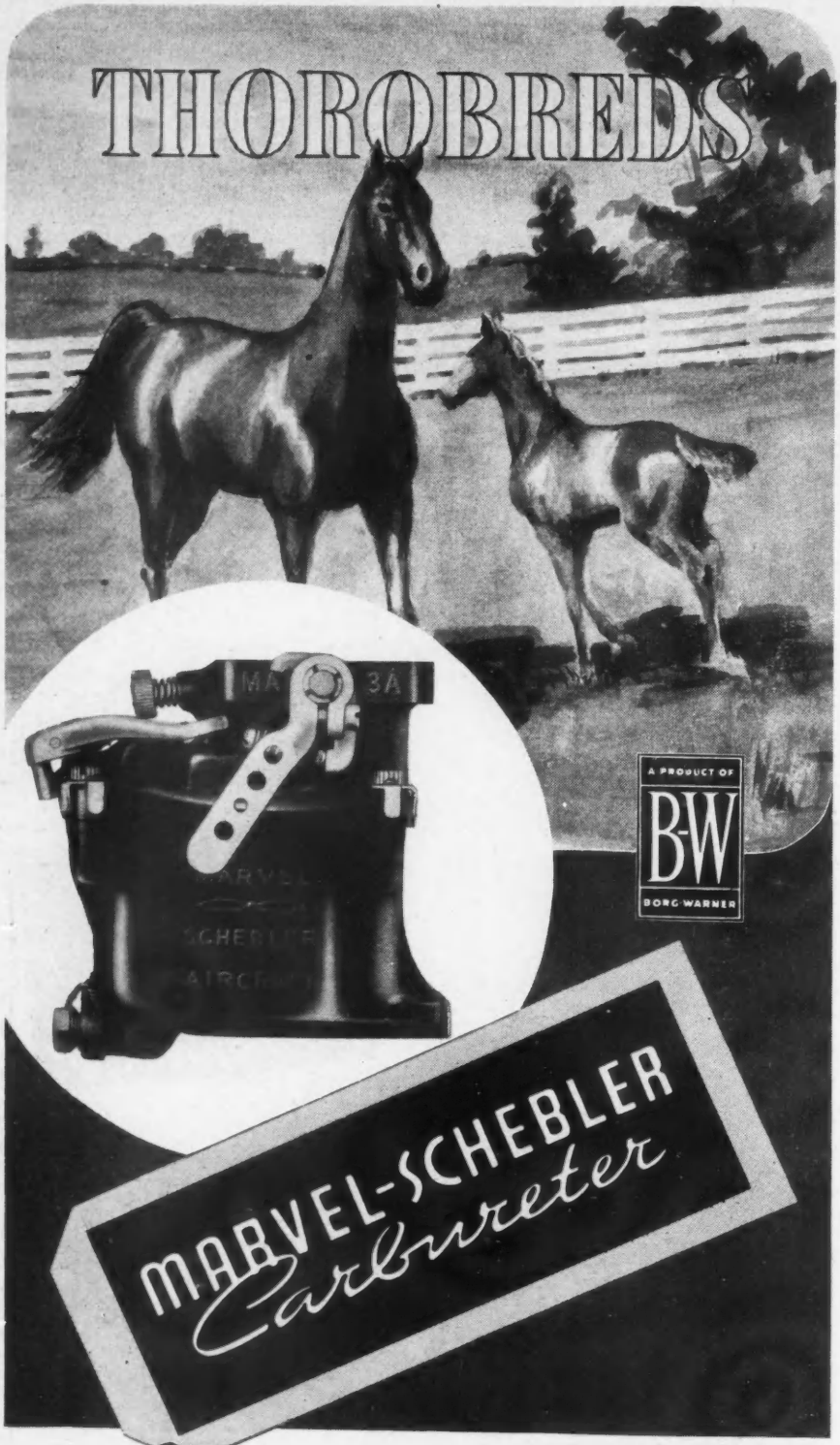




- *Buell Air Horns are tops in warning signal efficiency.*
- *Installed as original equipment on many Trucks and Buses.*
- *They reduce maintenance costs by decreasing stops, starts and slowdowns.*
- *All records prove that they save tires, brakes, clutches and gears.*
- *Cut gas and oil consumption.*

With a Buell the driver has greater security, maintaining a steady cruising speed. Slowing a 20 ton load from 50 MPH to 30 MPH means destroying a lot of energy thru brake lining and tires. It is replaced by burning more gasoline, increasing load on engine and tires again, to regain speed. This all costs money. We believe a Buell Air Horn is worth $100.00 yearly on any heavy highway vehicle. Then remember a Buell will last more than 10 years. How would you rate a $100.00 investment that earned $100.00 yearly for 10 years. Ask the man who has a Buell.

BUELL MANUFACTURING CO.
2975 Cottage Grove Ave., Chicago 16, Ill.



Total Registration

(Continued from page 43)

to repair the older vehicles, keeping them out of the scrap piles, than to buy new vehicles. If the estimate of registrations by the Public Roads Administration should turn out to be substantially correct, then scrappage during 1947 will be only about 300,000 vehicles.

Subnormal scrappage and no passenger car production during World War II years caused substantial increases in the production of parts and accessories. A few years before the war the average age of cars in use was about 4½ years. Today it is slightly over nine years. In 1941 about 51 per cent of the cars in use were less than five years old, while the same age bracket today is only 6 per cent of all cars in use. Thirty two per cent of the cars in 1941 were five to nine years old, and 17 per cent were 10 or more years old. Now the five to nine year old group consists of 59 per cent of all cars, and the 10 or older group has more than doubled.

It is quite natural that with this greatly increased age of vehicles in use there has been a greater need for parts and accessories with which to keep these vehicles in operation. This aftermarket production has been tremendous and is best illustrated by the dollar volume of that output as expressed by wholesale prices. The dollar volume of parts and accessories produced during 1946 was triple that of 1940, $1,753,000,000 as compared with $553,000,000. For 1947 the dollar volume will be well over the two billion dollar mark.

An example of the increasing importance of this aftermarket production is that in 1937 its value was equal to 16 per cent of the wholesale value of vehicles produced. In 1941 this percentage increased to 19 and in 1946 had jumped up to 54½ per cent. Expressed in another manner, the wholesale value of all vehicles produced in 1946 was 13 per cent greater than that of 1937, but for the same periods of time the wholesale value of parts and accessories production was 280 per cent greater. Between 1941 and 1946 the wholesale value of vehicles produced dropped 15 per cent, but the value of parts and accessories production increased 144 per cent.

Whether or not crystal gazing comes within the realm of your credibility, the signs all point to many new records in the automotive field. The next sixteen months will see one of the most active production periods of all times. The obstacles of such factors as labor difficulties and material shortages will be overcome in the most able manner which the automotive industries have demonstrated time and time again that they possess.

Why you get SURE FIRING ...with this NEW LOW-COST IGNITION CABLE

NEW 7-strand "MONEL" core
Increases spark-plug life
Improves engine performance
Reduces "shop-time"

For further information about this low-capacitance cable, write to Clark Cable Corporation, 11205 Berea Road, Cleveland, Ohio.

Here's a new ignition cable that provides all the features of low-capacitance design . . . at prices comparable with those of ordinary cable!

This cable, made by the Clark Cable Corporation of Cleveland, Ohio, has a core of only 7 wires instead of the usual 19.

This smaller diameter core provides all low-capacitance advantages . . . *less spark-plug electrode wear . . . less pitting of distributor parts . . . surer firing . . . higher voltage without increased battery drain . . . better engine performance.*

The wire that Clark's engineers selected for this core is Monel*. It's Monel's strength and toughness – greater than structural steel – that makes it possible to use 7 wires instead of 19. Because of its high ductility, Monel fits into the standard methods of wire drawing and stranding without difficulty or extra cost.

And Monel's corrosion resistance permits Clark to eliminate the tinning of the separate wires.

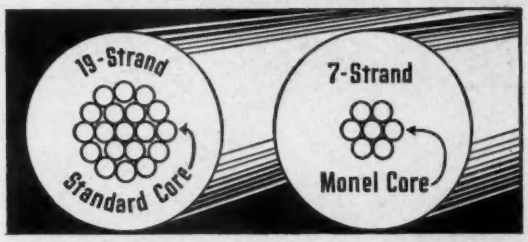
All these savings that Monel makes possible, Clark is passing on to their customers . . . at prices close to those of ordinary cable.

So, in looking for ways to cut manufacturing costs and improve product performance, don't overlook the Inco Nickel Alloys. They are helping to provide longer automotive service life in bus and truck exhaust systems . . . distributor rotor arms . . . car heaters . . . bolts, rivets and other fastenings.

Write now for your copy of "Individualized Inco Nickel Alloys."

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

EMBLEM OF SERVICE
INCO
TRADE MARK



Cross-section of new 7-strand Clark cable contrasted with 19-strand ignition cable of same outside diameter.

Note how the smaller Monel core, at right, permits thicker insulation. Thicker insulation means longer life, low-capacitance advantages.

MONEL* • "K"* MONEL • "S"* MONEL • "R"* MONEL • "KR"* MONEL
INCONEL* • NICKEL • "L"* NICKEL • "Z"* NICKEL *Reg. U. S. Pat. Off.

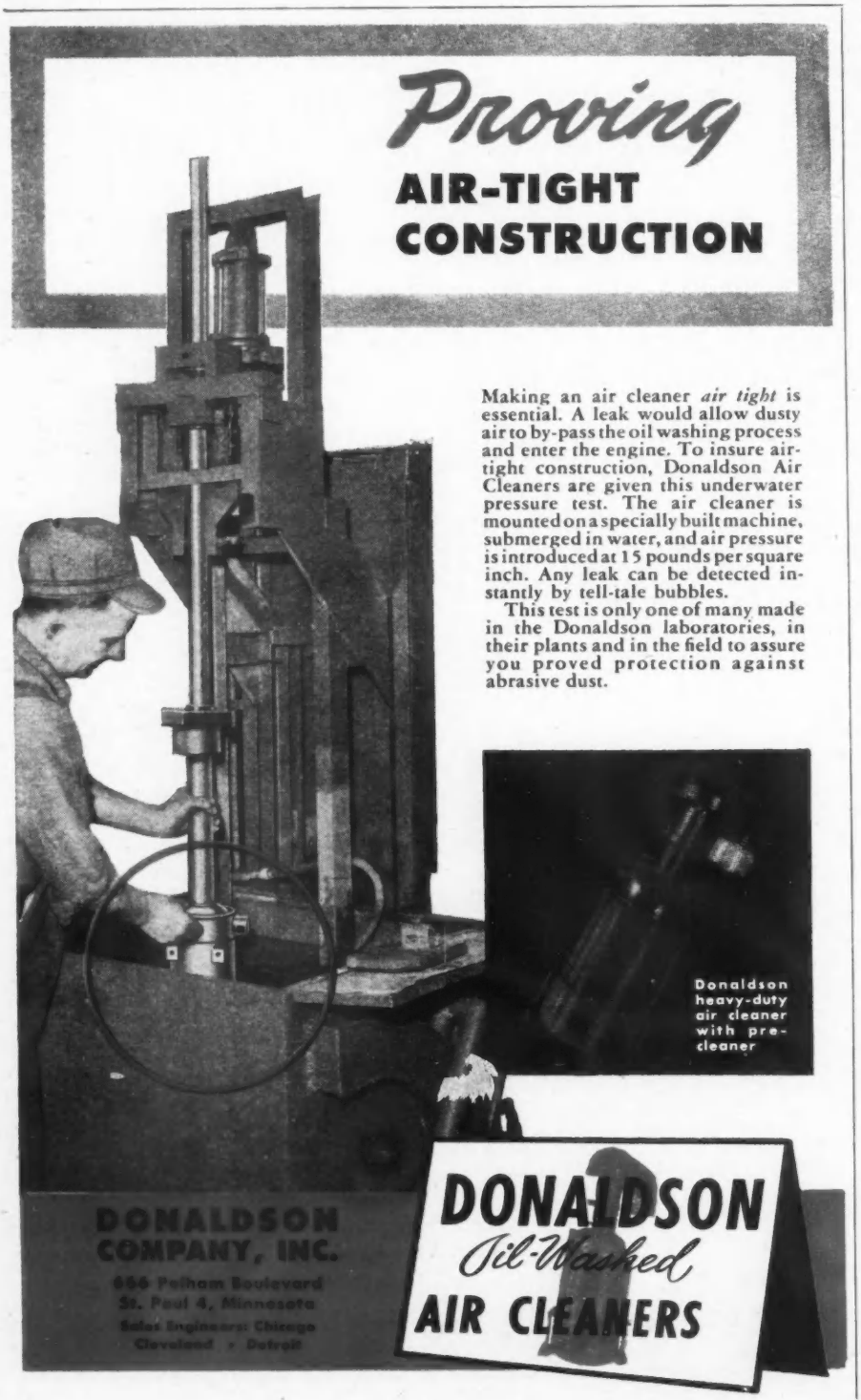
Builders of Small Vehicles

(*Continued from page* 46)

Custer Comet and Motor Chair

THE Custer Specialty Co., Inc., Dayton, Ohio, is manufacturing two three-wheel motor scooters: the Custer Chair, and the Custer Comet. The Chair is available with either a gasoline or electric motor. A four-stroke engine and a special hand-control transmission with two forward speeds and one reverse is provided for the gasoline model, and a battery sufficient for 15 miles per charge is furnished with the electric version. The electric scooter has three speeds forward and one reverse, and is reported to have a speed of 10 mph. Cruising speed of the gasoline model is stated as 25 mph with fuel economy of 75 mpg. Feature of these motor chairs is the absence of foot pedals. All control is contained in the steering arm and one lever. Overall length of the Custer Chair is 74 in., and tread is 26 in.

The Custer Comet, a small three-wheel handle-bar electric scooter, is intended primarily for individual transportation in large plants, warehouses or airports. A seat is provided for an extra passenger, and for maintenance men it has a platform and tool carrying space. It uses two six-volt batteries, and has two speeds: six mph and 12 mph. Overall length is 48 in., width 28 in., and height 48 in. Also manufactured by this company is an electric-powered utility truck .


Proving
AIR-TIGHT
CONSTRUCTION
Making an air cleaner *air tight* is essential. A leak would allow dusty air to by-pass the oil washing process and enter the engine. To insure air-tight construction, Donaldson Air Cleaners are given this underwater pressure test. The air cleaner is mounted on a specially built machine, submerged in water, and air pressure is introduced at 15 pounds per square inch. Any leak can be detected instantly by tell-tale bubbles.
This test is only one of many made in the Donaldson laboratories, in their plants and in the field to assure you proved protection against abrasive dust.
Donaldson heavy-duty air cleaner with pre-cleaner
DONALDSON COMPANY, INC.
DONALDSON
Oil-Washed
AIR CLEANERS

Bobbi-Kar Resold

LATEST report states that the recently organized Keller Motors Corp., with assembly plant at Huntsville, Ala., has acquired all design and manufacturing rights from the Dixie Motor Car Corp., which purchased the assets of the Bobbi Motor Car Corp., Birmingham. Keller Motors plans to manufacture lightweight convertibles and station wagons under the model names of the Keller Chief and Super-Chief. The latter will be equipped with a 49-hp four-cyl engine, and the Chief will have a smaller engine. First public showing is scheduled for Oct. 21-26 at New York City. A delivery car is planned for future production.

Motorette and Truckette

NOW in the second year of production, the Motorette Corp., Buffalo, N. Y., reports that over 4000 of its dimunitive three-wheel cars have been delivered. They have been built in two models to date—the Motorette and Truckette, the only difference between them being in the 9 cu ft of carrying capacity which has been added to the Truckette. The two passenger Motorette, however, has six cu ft of baggage and parcel space under the hood and under the seat. Both models are powered by six hp, air cooled, four stroke, single-cylinder engines. The left rear wheel is driven by a chain and sprocket arrangement. The clutch is an automatic centrifugal type.

The Motorette has an overall length of 90 in. and an overall width of 44 in. The wheelbase is 60 in., and the tread 34 in. With an aluminum body and a steel channel bar chassis resting on coil suspension springs, the entire car weighs about 410 lb and may be pushed scooter-style with one foot. A windshield is supplied as extra equipment. The electrical equipment is made up of a six-volt storage battery, voltage-regulated generator, push - button starter, two headlights and one tail light, and an automobile type horn. Speeds up to 35 mph and fuel economy of 60 mpg., are said to be attainable.

Davis D-2 Coupe

USING aircraft design, engineering and tooling principles, the Davis Motorcar Corp. has developed a three-wheel four-passenger coupe. It weighs 1328 lb and sells for $995 fob Los Angeles. Design details of this coupe and the production plans for manufacturing it were presented in the Sept. 15 issue of AUTOMOTIVE INDUSTRIES.

CHARACTERISTICS of Michigan WELDED STEEL TUBING

The Modern Electric Resistance Welded Steel Tube

- **STRENGTH**
- **WEIGHT**
- **DUCTILITY**
- **I. D. *and* O. D.**
- MACHINABILITY
- WELDABILITY

Today — when every manufacturer is seeking shortcuts in production and additional economies that will permit an equitable price reduction, many small shops and large factories are turning to electric resistance welded tubing as the low-cost solution to their fabricating problems.

Michigan welded tubing can be:

Engineering advice and technical help in the selection of tubing best suited to your needs. Address inquiries to:

Michigan STEEL TUBE PRODUCTS CO.

More Than 30 Years in the Business

9450 BUFFALO STREET • DETROIT 12, MICHIGAN

FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland, Dayton, Ohio—Dirks & Company, Portland, Oregon—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—American Tubular & Steel Products Co., Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—Drummond, McCall & Co., Ltd., Toronto, Canada.

PERSONALS

Recent Personnel Changes and Appointments at the Plants of Automotive and Aviation Manufacturers and Their Suppliers.

Ford Motor Co.—**Earl S. MacPherson**, appointed to engineering staff. He will be associated with **John Oswald**, Executive Engineer.

* * *

Tinnerman Products, Inc.—**H. R. Russell**, General Sales Mgr.

* * *

Howell Electric Motors Co.—**Charles T. Button**, General Sales Mgr.

The Timken Roller Bearing Co.—**H. C. Edwards**, Director of Research and Development, succeeding **J. F. Leahy**, retired. **Walter F. Green**, Manager, Research and Development.

* * *

Dana Corp., Spicer Manufacturing Div.—**Robert B. Haynes**, appointed to position of works manager.

* * *

Fairchild Engine and Airplane Corp. —**Robert B. Kinkead**, Chairman of the export committee of the Aircraft Industries Association, has been appointed export manager.

* * *

Mack Trucks, Inc.—**John G. Caley**, Manager of the National Accounts Dept. of Southern Div., with headquarters in Atlanta.

* * *

Motor and Equipment Wholesalers Assoc.—**Carl Johnson**, Johnson Brothers Auto Supply Co., appointed to Board of Directors.

* * *

United States Rubber Co.—**E. M. Cushing**, appointed Industrial Relations Director.

* * *

General Motors Corp., United Motors Service Div.—**Henry B. Smith**, Asst. General Merchandising Mgr.

* * *

Chrysler Corp., Plymouth Div.—**H. B. Daniels**, Director of Regions.

* * *

Chrysler Corp., Dodge Div.—**C. A. Templeton**, Sales Supervisor.

* * *

Graham-Paige Motors Corp.—**Alfred E. Barton**, elected Vice-President and Treasurer.

* * *

Westinghouse Electric Corp.—**Henry N. Muller, Jr.**, Manager, Educational Dept. and **Guy Kleis**, Manager, Graduate Student Training.

* * *

Willys-Overland Motors — **Benjamin C. Bowker**, Asst. to the President, has been appointed Director of Public Relations for the company.

* * *

Willys-Overland Export Corp. — **Charles S. Dennison**, appointed Sales Manager.

* * *

Gulf Oil Corp. and Gulf Refining Co. —**R. M. Bartlett**, elected Vice-Pres. in Charge of Fuel Oil Sales. **H. P. Hobart**, elected Vice-Pres. in Charge of Lubricating Oil Sales.

* * *

Monsanto Chemical Co., Plastics Div. —**Dr. Reid G. Fordyce**, Sales Development Mgr. and **Edmund S. Childs**, Asst. Mgr., Sales Development Dept.

* * *

The Glidden Co.—**L. F. Long, Jr.**, Manager of the Aviation Dept.

* * *

Universal Friction Materials Co.— **George Reindal, Jr.**, elected President; **A. C. Teetsel**, Vice-President in charge of Manufacturing.

* * *

Champion Spark Plug Co.—**J. R. McGeorge**, appointed to Advertising Dept. in charge of Public Relations.

* * *

Square D Co.—**L. W. Mercer**, Vice-Pres. will serve as General Manager of the newly formed General Sales Dept. and will also continue as General Manager of the Switch and Panel Div. **F. H. Roby** has been appointed Asst. General Manager.

* * *

Monroe Auto Equipment Co.—**William D. McIntyre**, Executive Vice-President and Treasurer, **Charles S. McIntyre**, Vice-President in charge of Sales, and Secretary. **J. E. Eckel**, Sales Manager of Parts and Accessory Div.

(*Turn to page 78, please*)

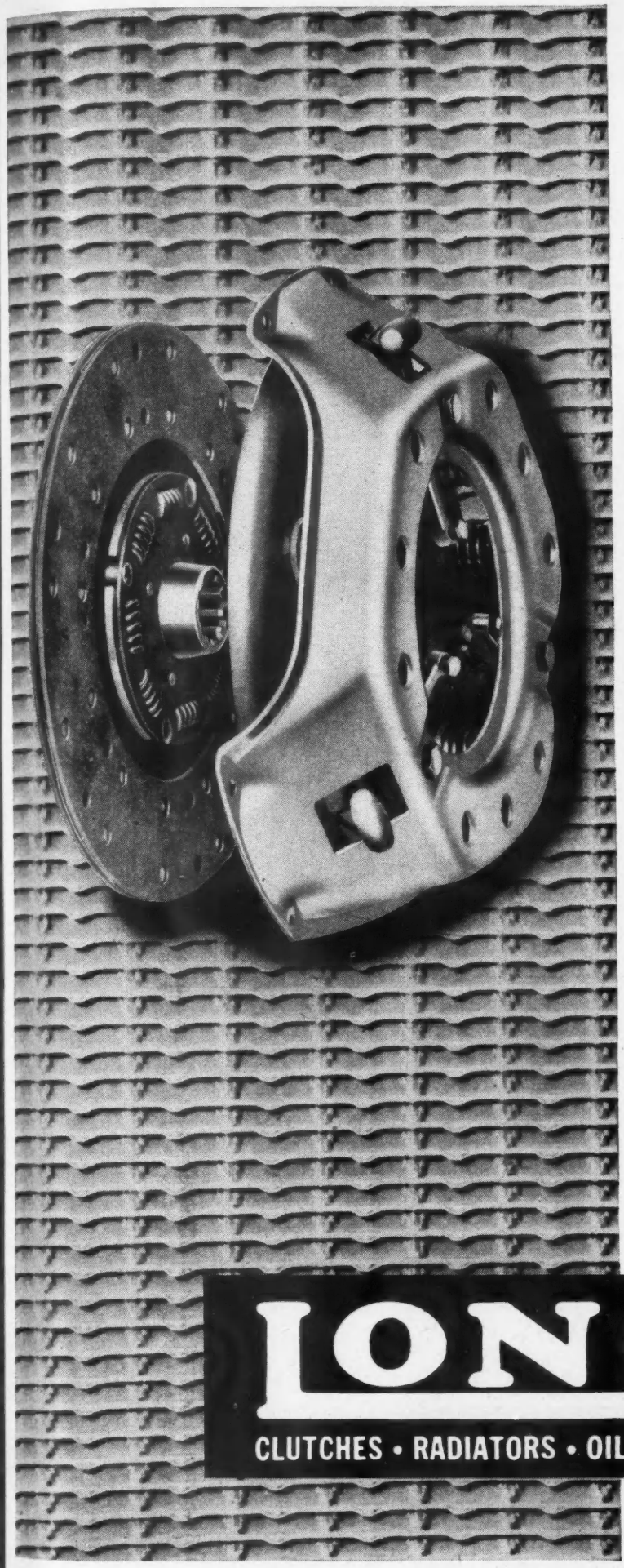
Just a forging, **but — the forging process develops the greatest combination of physical properties (tensile and compressive strength, ductility, impact and fatigue strength) and the greatest uniformity of quality of any method of manufacturing metallic shapes . . . Wyman-Gordon has pioneered in the development of intricate forgings typical of which is the pump housing forging for a controllable-pitch aircraft propeller.**

WYMAN-GORDON

Forgings of Aluminum, Magnesium, Steel

WORCESTER, MASSACHUSETTS, U. S. A.

HARVEY, ILLINOIS - DETROIT, MICHIGAN



Easy Does It!

You call on your clutch at every major change of speed or direction. Tight-squeeze parking at the curb... throttle-jockeying in heavy traffic. In stop-and-go driving or rolling on the open road, it helps a lot when "easy does it!"

Long clutches respond instantly to light pedal-pressure. Since 1922, they've made it easier to drive millions of cars, trucks, buses and tractors.

LONG MANUFACTURING DIVISION
BORG-WARNER CORPORATION
Detroit 12, and Windsor, Ontario

LONG

CLUTCHES • RADIATORS • OIL COOLERS

ENGINEERING B-W PRODUCTION

A PRODUCT OF BORG-WARNER

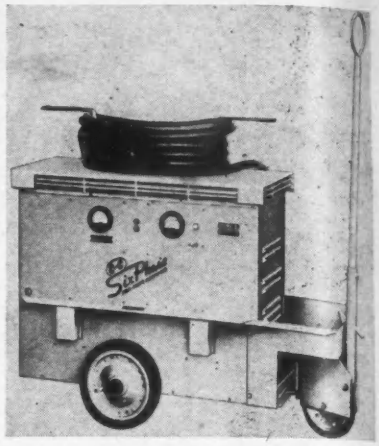
NEW Products for AIRCRAFT

For additional information regarding any of these items, please use coupon on page 58.

(*Continued from page* 56)

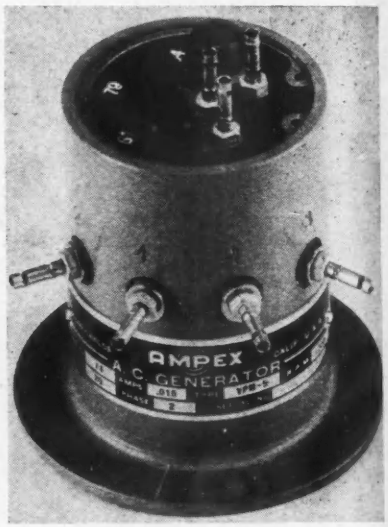
as the Douglas DC-6, Boeing's Stratocruiser, Martin's 202 and 303 and Consolidated Vultee's C240 and military jet propelled types such as the P-80, P-84, XB-45, XB-46 and FJ-1 and others are started by this power supply.

The E24-500T has a continuous rating of 500 amp at 28 volts d-c and momentary load rating of over 3000 amp. According to the manufacturer, this rectifier employs a 6-phase full wave bridge circuit which is equivalent to 12 phase half-wave. This results in a smooth d-c output without disturbing ripple; also there are no interfering harmonics in the a-c line. The low ripple characteristic (less than 2 per cent) permits operating and testing radio and electronic equipment. The rectifier operates on standard 3-phase power.



Heavy duty aircraft rectifier made by McColpin-Christie Corp.

F-125—Light Weight A-C Generators



Ampex Electric Corp., San Carlos, Calif., offers light weight, permanent magnet a-c generators whose features are Sine wave distortion below three per cent on standard models—below 1½ per cent on special models; output voltage linear with rpm and accurate to ± two per cent; absence of collector rings, commutators or brushes. The generators are totally enclosed.

Aerojet Realty Buys WAA Jet Propellant Plant

The Aerojet Realty Co., a subsidiary of Aerojet Engineering Corp., has bought an AAF jet propellant plant in Azusa, Calif., for $585,000 from the WAA. The sale included 42 Navy test houses, constructed for the development of jet propulsion for catapulting planes from ship decks.

When production, engineering and purchasing men discuss brake lining, it's only natural that Grizzly is brought into the conversation. Grizzly's position as one of the largest, most dependable brake lining manufacturers plus its enviable record of producing fine brake lining for both automotive and industrial fields for over 30 years, merit the projection of Grizzly into any brake lining discussion.

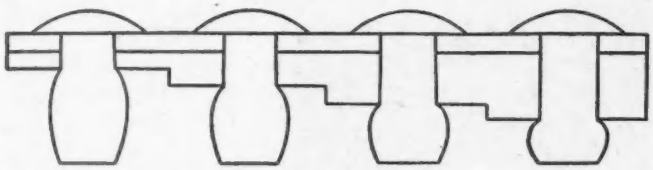
The next time brake lining or brake lining problems enter your job, consult Grizzly. Grizzly's research, engineering and manufacturing experiences can be of real assistance to you.

GRIZZLY MANUFACTURING COMPANY
PAULDING, OHIO
PLANTS AT PAULDING AND BELL, CALIF.
Warehouse Stocks in Principal Cities

No. 5 OF A SERIES: *"How Du Pont Explosive Rivets Do an Efficient, Economical Fastening Job—Fast"*

HOW GRIP RANGE INCREASES UTILITY

of Each Explosive Rivet Size . . . Reduces Sizes Needed



Sketch explains grip range. An Explosive Rivet of 3/16" shank diameter and 3/16" nominal grip (see table below) has minimum grip of .073"; and a maximum grip of .197," or a total grip range of .124".

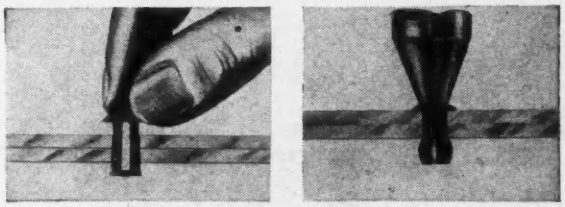
Any one size Industrial-type Explosive Rivet can be used in a wide range of material thicknesses. For this reason, an inventory of a few sizes will meet many shop requirements. The table shows grip range of Explosive Rivets in various diameters.

INDUSTRIAL-TYPE STRAIGHT CAVITY EXPLOSIVE RIVETS

RIVET DIAM.	NOMINAL GRIP	ACTUAL GRIP RANGE	TOTAL GRIP RANGE
1/8"	1/16"	.010"–.072"	.062"
"	1/8"	.073"–.134"	.061"
"	3/16"	.135"–.197"	.063"
"	1/4"	.198"–.259"	.061"
5/32"	1/16"	.010"–.072"	.062"
"	1/8"	.010"–.134"	.124"
"	3/16"	.073"–.197"	.124"
"	1/4"	.135"–.259"	.124"
"	3/8"	.260"–.384"	.124"
3/16"	1/16"	.010"–.072"	.062"
"	1/8"	.010"–.134"	.124"
"	3/16"	.073"–.197"	.124"
"	1/4"	.135"–.259"	.124"
"	3/8"	.260"–.384"	.124"
"	1/2"	.385"–.510"	.125"

One explosive Rivet may be used to rivet assemblies varying as much as .125" in thickness. Such a range of application of one rivet size can mean substantially increased production.

ANYONE CAN EASILY SET EXPLOSIVE RIVETS



Insert Rivet in prepared hole. Touch tip of Du Pont Riveting Iron to head of Rivet. Heat fires minute charge in Rivet shank. Shank expands so that it completely fills hole. Barrel-shaped head formed on opposite end of Rivet locks it securely in place. Quick, one-person job. No rivet-finishing operations required. No parts to vibrate loose.

In addition, Explosive Rivets make fastening jobs easy, speed the operation and often reduce installed fastener costs. Perhaps you can use them right now in your own plant. Why not send us a sample of your fastening work? Our engineers will determine how these versatile fasteners can help you do a better, more efficient fastening job. Write for manual. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

OUTSTANDING FEATURES OF EXPLOSIVE RIVETS

1. Easy to insert . . . close hole tolerances unnecessary.
2. Quick to set . . . 15 to 20 Rivets a minute.
3. Large grip range permits wide use of each Rivet size.
4. Strength comparable to solid Rivets.
5. One piece . . . no parts to vibrate loose.
6. No rivet-finishing operations required . . . neat appearance.
7. Safe to handle . . . use . . . store.

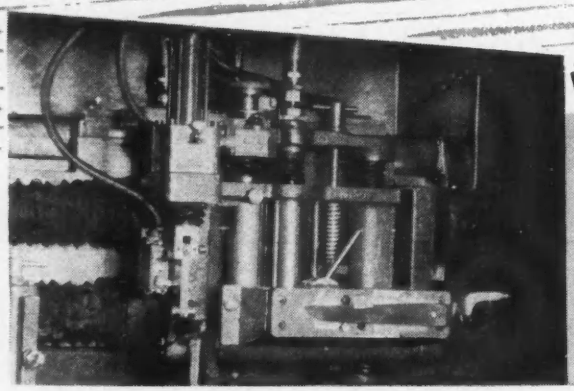
DU PONT EXPLOSIVE RIVETS

A Product of Du Pont Explosives Research

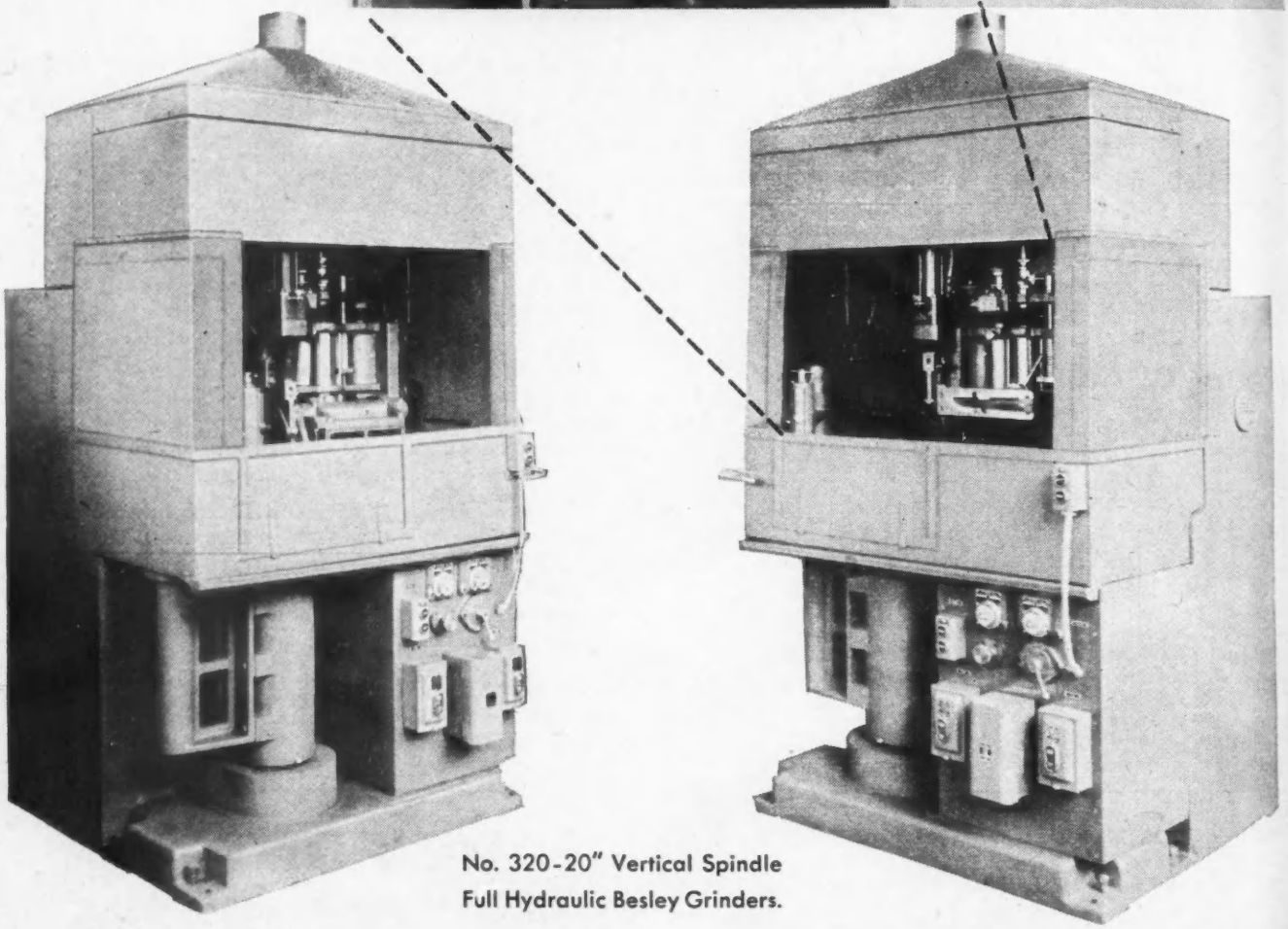
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

DU PONT
REG. U.S. PAT. OFF.

TEAMED UP to cut



Hedge shear forging in place in right hand machine, ready for grinding operations.



No. 320-20" Vertical Spindle Full Hydraulic Besley Grinders.

BESLY

BESLY GRINDERS AND ACCESSORIES
BESLY TAPS • BESLY TITAN ABRASIVE WHEELS

Production Costs . . .

ON FLAT SURFACE GRINDING

BESLY GRINDERS

ONE OPERATOR USING TWO MACHINES NOW GRINDS UP TO 600 SURFACES PER HOUR

The most talked of equipment at the Machine Tool Show, these new Besly Grinders offer practical economies for many types of flat surface grinding. Used in pairs, as illustrated, they are equipped for grinding faces of hedge shears, wood chisels, plane bodies, cutlery, etc.

First, the operator places the rough forging in the fixture on the right hand machine. The fixture swings down into the horizontal position, reciprocates across face of grinding wheel—at the same time feeding down automatically. On reaching the micrometer stop screw, the work recedes from the grinding wheel and returns to the unloading and loading position.

The operator, whose normal position is between the two machines, takes the semi-finished forging from the right hand machine and repeats the operation on the opposite side of the forging using the second machine.

Oil is used as a coolant. The modern design of these machines makes it possible to control most of the mist.

The number of passes across the face of the grinding wheel and the speed at which the work passes back and forth across the wheel are readily controlled by the operator—also the hydraulic pressure and the speed of the down feed.

This work was formerly done by hand-operated machines of the single spindle type. Now, a single operator, using two of these machines, can grind 600 complete hedge shear forgings or 600 surfaces per hour.

By changing fixtures, these machines will also bevel grind hedge shears . . . and are adaptable to a large variety of flat surfaces—including wood chisels, plane bodies, combination square bodies, scissors, cutlery and similar flat surface units.

Perhaps grinders of this type will aid you to offset rising production costs. It will pay you to discuss the possibilities with a Besly engineer. Besly's 50 years of accumulated experience in answering grinding problems is yours to draw on. Write TODAY!

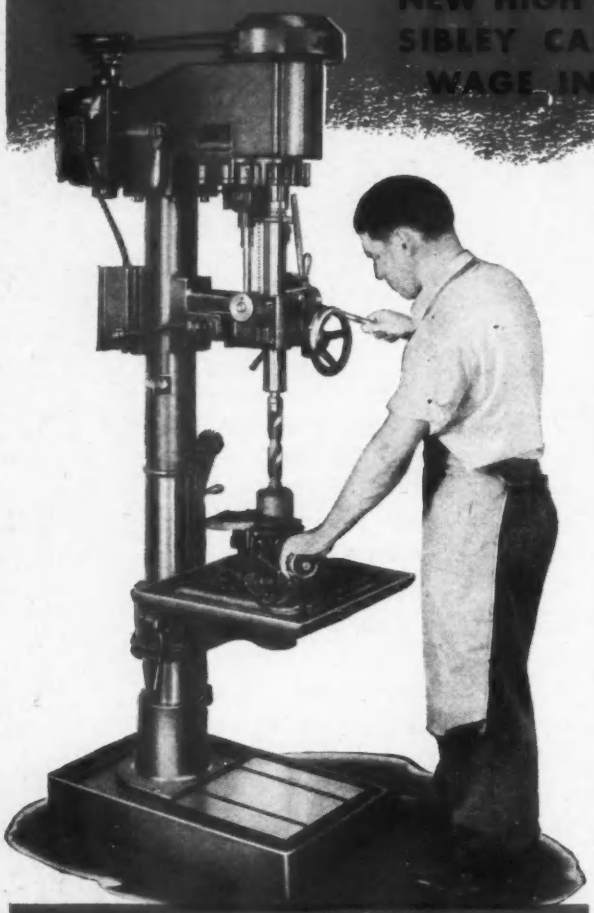
BESLY CHAS. H. BESLY & COMPANY

CHARLES H. BESLY AND COMPANY • 118-124 N. Clinton St., Chicago 6, Ill. • Factory: Beloit, Wis.

HAVE YOU LOST THE ART OF ?

Time and Motion Study

IF NOT—YOU'LL SOON DISCOVER HOW THE NEW HIGH SPEED C-20 SIBLEY CAN ABSORB WAGE INCREASES!



You say—Only by more output can costs be cut!

All right—compare T. & M. studies on your present equipment with this new 20" Sibley drilling and tapping machine. We can tell you *now* the difference will surprise you!

Here is a shop machine designed by shop men. You have easy access to controls—turn a knob to select the proper geared power feed. A lever allows convenient shifting of V-belt. This Sibley is a precision tool for sensitive drilling at high speeds, but has ample power to drill 1½" in mild steel. 8 speeds range from 65 to 1360 RPM, driven by a 2 H.P. motor.

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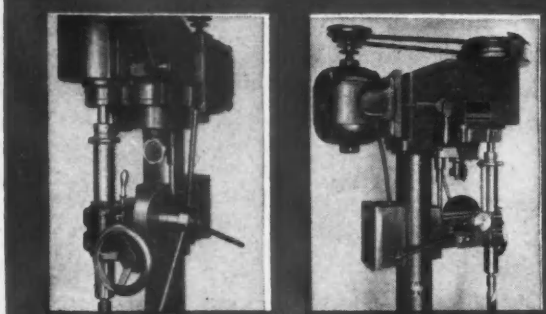

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PUBLICATIONS

(*Continued from page* 58)

Much of the text is presented in easy-to-read tables and charts.

D-98—Transfer Machines

Greenlee Bros. & Co.—8-page 2-color bulletin SM-453, gives facts concerning the development and use of the Greenlee Automatic Transfer Processing machines. It traces the early development of the machines and concludes with a description of several of the latest machines which are being used by mass-production industries. Photographs, production figures, illustrated operation charts are included. Bulletin A-401 illustrates and describes a new threading attachment and arrangement for Greenlee four and six-spindle automatic screw machines.

D-99—Lift Truck Guide

Towmotor Corp.—A new 28-page Lift Truck Guide, in handy pocket size, illustrates with drawings the complete line of Towmotor materials handling equipment, together with a list of important specifications for each model.

D-100—Analysis of Taft-Hartley Act

Employers' Advisory Council—Summary and Observations of the Labor-Management Relations Act of 1947 has been prepared by the Council and is available by writing to them at 1218 Chestnut St., Philadelphia 7, Pa.

D-101—Square D Products

Square D Co.—A new Square D Digest serves as a valuable source of reference and information on Square D equipment manufactured by the Switch and Panel and Industrial Controller Divisions. It includes size, capacity and dimensional data, together with current prices, and includes products of the various divisions as well as convenient tables for quick reference in proper selection of devices.

Personals

(*Continued from page* 72)

Young Radiator Co.—**William E. Becker**, Purchasing Agent in Charge of Purchasing and Procurement Requirements.

* * *

Kaiser-Frazer, Indianapolis Rolling Mill Div.—**E. R. Ordway**, appointed General Manager.

* * *

The International Nickel Co. of Canada, Ltd.—**Lance H. Cooper**, of London, elected Asst. Secretary and Asst. Treasurer.

* * *

Vanadium-Alloys Steel Co.—**Harry M. Reed**, appointed Secretary of the Board.

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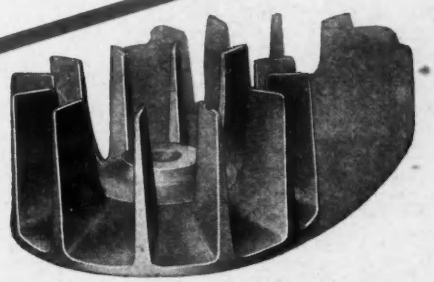
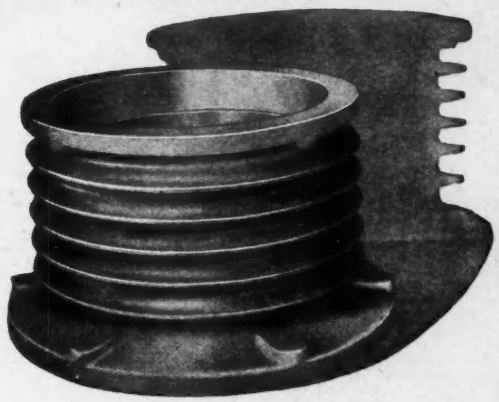


PERMITE PERMANENT MOLD CASTING



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ALUMINUM PERMANENT MOLD, SAND and DIE CASTINGS...HARDENED, GROUND and FORGED STEEL PARTS

Big Demand for Cars

(*Continued from page* 41)

production. As production has not exceeded normal replacement since the end of the war, the demand can be expected to continue for three to five years. As trucks are being produced at a rate of 50 per cent above the prewar level, the period of shortage will not extend so long—in fact, there are already some indications of slowing of demand on the heavier trucks. After the shortage has been satisfied, normal replacement volume is predicted. Thus the outlook is favorable for some time to come.

Factory prices of automobiles have increased a minimum of fifty per cent, and there is concern as to the influence these prices may have on the long range market. It is a proper matter of concern, but it must be realized that the income of the people has also increased as much or more than these prices. Labor rates that were $0.90 per hour in 1941 are now $1.50. If General Motors had sold automobiles prewar at barter rather than for money, a certain number of bushels of grain or head of hogs would have been exchanged for a car. On today's market price for wheat, corn or hogs, GM would receive a lesser quantity than prewar. This indicates that the prices of automobiles have inflated less than farm products, and it is known that they are far below the level of most manufactured goods. So long as the manufacturer can maintain this price relationship, he will be assured of a strong demand for his products.

Some factory personnel are concerned that dealers, having made extremely high profits on low volume of new cars and at the same time wholesaling used cars, will not be volume minded in the days to come. But dealers, good business men as they are, could not possibly ignore the fact that they were not only able to survive the war years but actually to make the highest profit in their history through customer labor and parts sales. Surely, both dealers and manufacturers realize the necessity of having a large quantity of products in the hands of users as a backlog against the low volume of new cars that will be experienced some day. Manufacturers must remain volume producers, and dealers must remain volume retailers in order to protect the investment that each has in the business.

All of our policies should be established on a long term basis rather than as a temporary expedient. In this category falls the wholesaling of used cars. Some day we will wholesale at a loss, not at a profit as at present, and facilities for reconditioning or an organization for selling used cars at retail must be developed. It is well known that the ability to move used cars will, as in the past, control the movement of new cars. Consideration should also be given now to the hiring and training of salesmen. Present tax levels will absorb part of the cost, and it is an investment that the dealer cannot afford not to make when the appropriate time arrives to get ready for selling effort.

The most serious accusation against the automobile industry is the so-called black or grey market in new and used cars. Not many dealers have been guilty of participating in this market; rather, most of the new cars appearing on the used car lots have come from legitimate customers who have succumbed to the temptation of easy money and sold the car delivered to them. There are also the many cases of individuals who had orders placed with several dealers and took delivery from each, with the clear intention of profiting on resale. City associations

(*Turn to page* 82, *please*)

PERFORMANCE
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Thermostats
IN A RANGE OF TYPES FOR EVERY CAR
• Positive control of cooling liquids, as achieved by a Dole Thermostat, contributes to better motor operation and improved car performance —at all seasons. Its plus values are quick warm-up with specific savings in gas, oil and motor wear.
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(*Advertisement*)

Varied Parts Fabricated with "Lincolnweld" Automatic

BY C. H. BUCKMASTER, DISTRICT MGR.
THE LINCOLN ELECTRIC COMPANY
DETROIT, MICHIGAN

THE automotive industry is fabricating an increasingly wide variety of parts with "Lincolnweld" automatic shielded arc welding. A few recently developed applications are shown here.

Fig. 1 shows the standard "Lincolnweld" self-propelled carriage—a truck frame member in a tilting jig. This "Lincolnweld" carriage is used both for applications in which the work remains stationary and the head is motor-driven along the beam . . . and for applications where the work moves while the head remains stationary. Examples of parts made by the first method are shown in Figs. 2, 3 and 4.

The half of an axle housing (Fig. 2) is welded with two heads on either side welding horizontally, using the fillet-welding attachment. Welding speed is 90″ per minute. Previously this housing was welded with automatic carbon arc equipment, with a speed of 25″ per minute, and three machines were required to get sufficient production. Now one "Lincolnweld" machine turns out the same amount of work, and welds are better quality.

The generator frames (Fig. 3) are welded ten at a time, being mounted end to end in a special jig so that the joints are lined up for one continuous weld. The ten frames are welded in one minute.

Fig. 4 is a section of a bumper jack ratchet that is approximately 3′ long. It is made by welding a stamped and formed ratch to a piece of tubing. A two-fixture jig is used, one ratchet being welded while parts for another are being clamped in the other side of the jig. Welding speed is 90″ per minute.

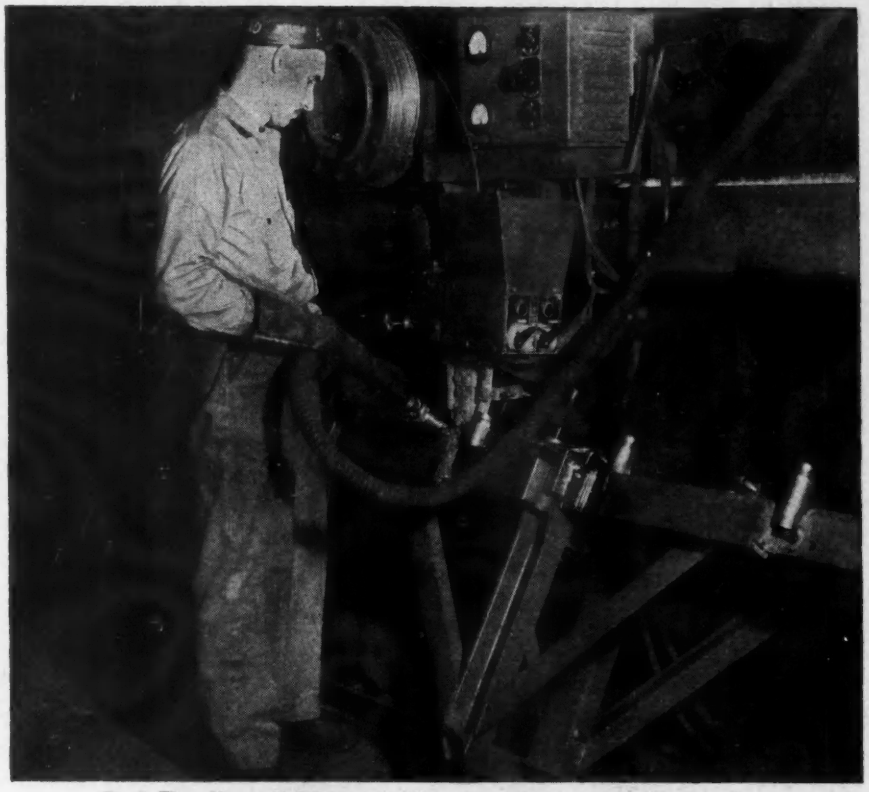


Fig. 1. The self-propelled "Lincolnweld" carriage fabricates a truck frame member. Operator is removing slag with vacuum hose.

The torque tubes (Fig. 5) are examples of circumferential welding in which the head remains stationary. The pencil shows relative sizes. A special "lathe" type fixture rotates the work. Two "Lincolnweld" heads are used to simultaneously weld the spline to one end and the joint to the other end. The welding time for the smallest diameter is 12 seconds and for the larger diameter, 18 seconds.

In the "Lincolnweld" process the arc and molten metal are blanketed by flux at all times, completely protecting the work is moved and the "Lincolnweld" weld metal from contact with the air. This assures maximum quality of welds and makes possible use of extremely high amperage for faster welding and lower costs. Spatter is nil, eliminating the expense of weld cleaning. The absence of arc rays and smoke improves working conditions.

Four sets of drive gears supplied with the traveling carriage permit adjustment of welding speed from 6 inches to 110 inches per minute.

Fig. 2. Half of axle housing. Two "Lincolnweld" heads make the horizontal welds simultaneously.

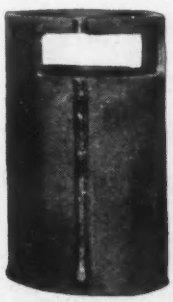


Fig. 3. Auto generator frame, welded longitudinally.

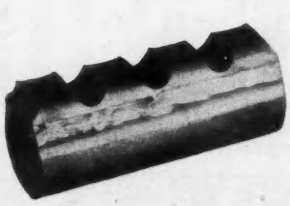


Fig. 4. Section of auto bumper jack.

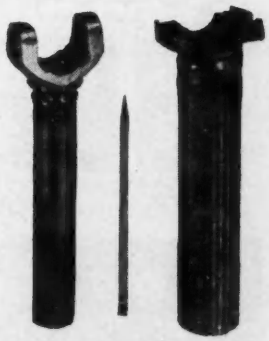


Fig. 5. Torque tubes, welded circumferentially.

The above is published by LINCOLN ELECTRIC in the interest of progress. Free Bul. 439 on the "Lincolnweld" process is available. Write The Lincoln Electric Company, Dept. 435, Cleveland 1, Ohio.

Demand for Cars

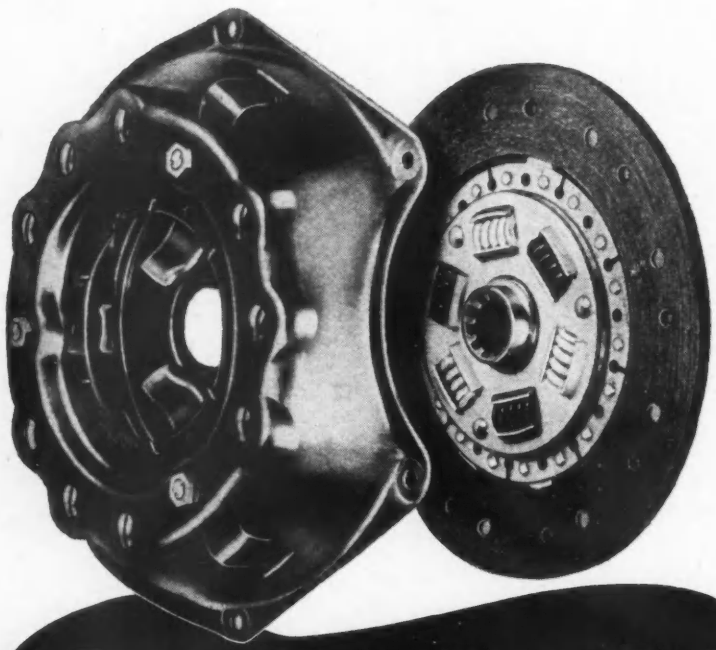
(*Continued from page* 80)

could eliminate many of these duplications by screening all orders through a central point. It is a practice that should be controlled because the industry is blamed for its existence, and good customers who are still waiting for delivery are rightfully incensed over the availability of new cars on used car lots when their needs are ignored.

While dealer responsibility should be waived in the majority of cases so far as black market practices are concerned, a great many dealers are guilty of other practices equally as unsound over the long range business cycle. One is in under-allowing on used cars. When a dealer sells a new car at full list and makes a full profit on the deal, it is inexcusable to insist on a used car trade as part payment and allow several hundred dollars below the market price. The customer has a good memory, knows he was not fairly treated, and the dealer is trading a profit now for a bad customer relationship. It is realized that most dealers are independent merchants; the factory cannot, and has no desire to control the price allowed on used cars. But those dealers who are following such a practice are making a serious business mistake that will not, over a business cycle, pay a profit. A responsible merchant builds fairly for the future.

The same principle applies to loading the car with accessories. The dealer should sell all the accessories he can, but he should be sure they are sold, and not forced on the customer who accepts them in order to secure delivery of a car.

Packs are prevalent in many areas. In the early days of the industry, dealers were profitable on a 17 per cent direct and 15 per cent associate new car discount. As the used car trading increased and the dealer over-allowed on trades, the discounts increased until they are currently in the area of 25 percent. To pack the price is increasing the discount, which has proven adequate in the past, and the defense that it is then used as over-allowance on trades does not stand up — certainly under present conditions. Sound business principles are necessary if any dealer hopes to build permanently. Hidden charges, or over-charges, are bad practice and it is unfortunate to see an otherwise sound dealer adopting policies of operation that will eventually cost more than they produce.



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CHICAGO 38, ILLINOIS

Cadillac

(*Continued from page* 29)

the parts are routed into the second polishing room where the nickel coating is color buffed and inspected. Then they are ready for the final step—chromium plating. As in the other plating rooms, chromium plating is done in an automatic conveyorized machine which is also supplemented by a number of hand plating tanks. These are used primarily for handling long pieces of work which cannot be accommodated within the automatic plating machine. A feature of the third section plating room is a continuous barrel plating machine for small parts and fastenings, which produces a zinc-chromate coating said to be many times more durable than conventional zinc plating.

The chromium plated parts are routed into the third section polishing room for a selective polishing of plated parts and then to the inspection conveyor. The latter is a wide-belt conveyor traveling under a painted canopy which reflects light from a battery of fluorescent tubes, producing a light source of excellent quality for the inspection of chromium-plated parts.

Parts that require preliminary assembly, such as the front end grille, are carefully assembled before leaving the polishing room to prevent marring or scratching of the finish. The assemblies then are transported to the final line for integration in the front end assembly.

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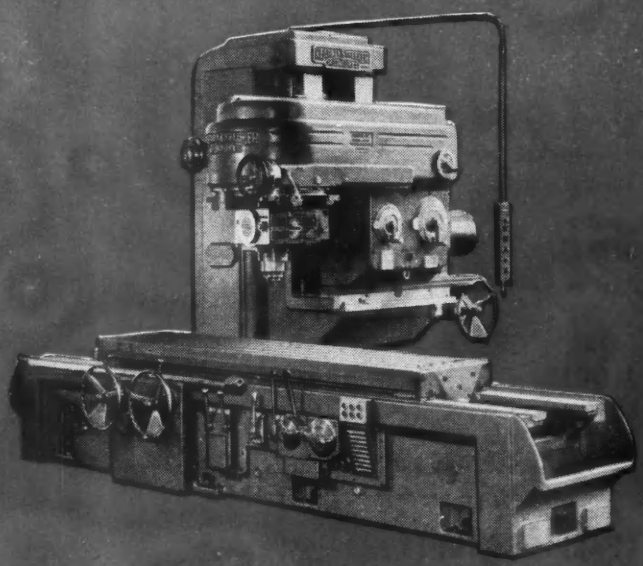
outstanding machine tools . . . First First in all-round performance!



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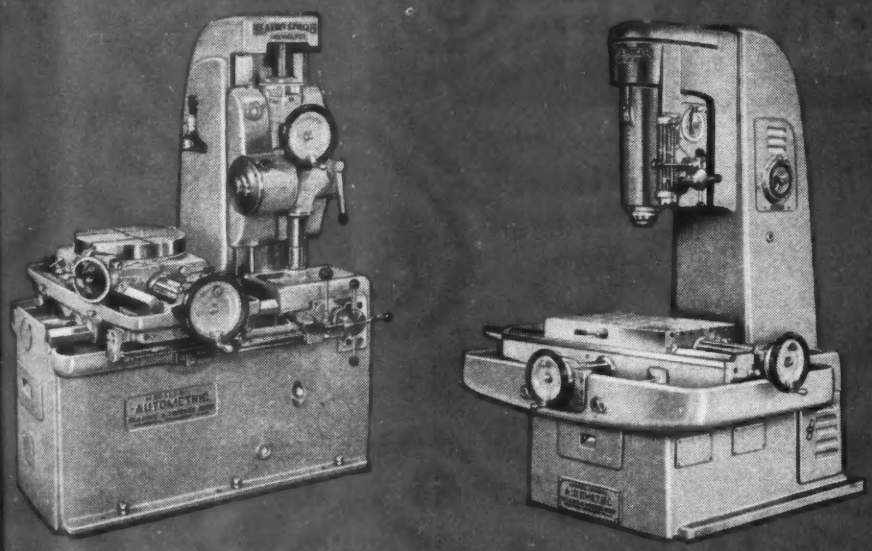
The new Model 5D combines bed-type machine working range with revolutionary Kearney & Trecker Rotary-Head Principle of Milling. Mills any geometric shape, in horizontal or vertical planes, directly from blue print, without models or templets. For versatility of application, it leaves nothing to be desired. If you make dies for drop forging, die castings, plastic parts or molds for permanent mold castings, you cannot afford *not* to investigate this machine.

2 BORING MACHINES AT THEIR BEST— DESIGNED TO PUSH PRECISION CURVES UP



America's finest precision boring machines

The Model B Autometric (left) for horizontal work and the Model C Autometric (right) for vertical work. Each machine is the direct result of nearly a half-century of experience and several years of intensive research in design and manufacture of precision machine tools. Every refinement, of a practical nature, that can be used in performing highly accurate work has been incorporated in these machines. You will be amazed at the three-dimensional accuracy in the performance of these precision tools.

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KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

A-481

Airbriefs

(*Continued from page* 42)

New Air Force Planes

The newly-created Air Force inaugurated its independence by announcing three radically new combat aircraft. The Boeing XB-47 represents the most radical departure into the new sonic design realm yet revealed. Featuring swept wing and tail surfaces, unique feature of the giant, 62-ton bomber is the suspension of two turbojet engines forward of and below each wing with an additional engine located near the wing tip. This unusual layout resulted directly from the use of wing sweep, which, by moving the center of lift rearward required maintenance of the engine weight forward to compensate for the additional wing weight aft. Since the thin wing torsional resistance could not accommodate three engines on the narrow cantilever support, the third engine on each side was mounted outboard near the tips. This placed these engine weights directly on the wing, thereby saving fuselage-wing bending moment strength requirements. The six General Electric J-35 turbojet engines produce 24,000 lb of static thrust which is augmented by 18 rocket JATO units mounted within the aft fuselage and producing an additional 18,000 lb of thrust. This tremendous power enables the XB-47 to takeoff in a distance comparable to conventional transport planes.

Martin Transport Enters Service

First Martin 2-0-2 has been delivered to Northwest Airlines with entry into regular passenger service scheduled this fall. Current certification of the new type, first post-war twin-engine transport to enter service, recognizes the unique automatic propeller feathering system on the 2-0-2 as meriting an added allowable gross weight. Airline pilots oppose the move on the grounds that the system does not furnish good and sufficient reason for an increased takeoff weight. CAB Chairman Landis investigated personally and made an "engine failure on takeoff" flight in the 2-0-2 and pronounced the feature satisfactory.

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Self-Locking PALNUTS

Reo Bus

(*Continued from page* 27)

corners. The sides of the coach are protected by a rub rail reinforced by the floor, a skirt channel and another angle on the interior of the coach at seat level.

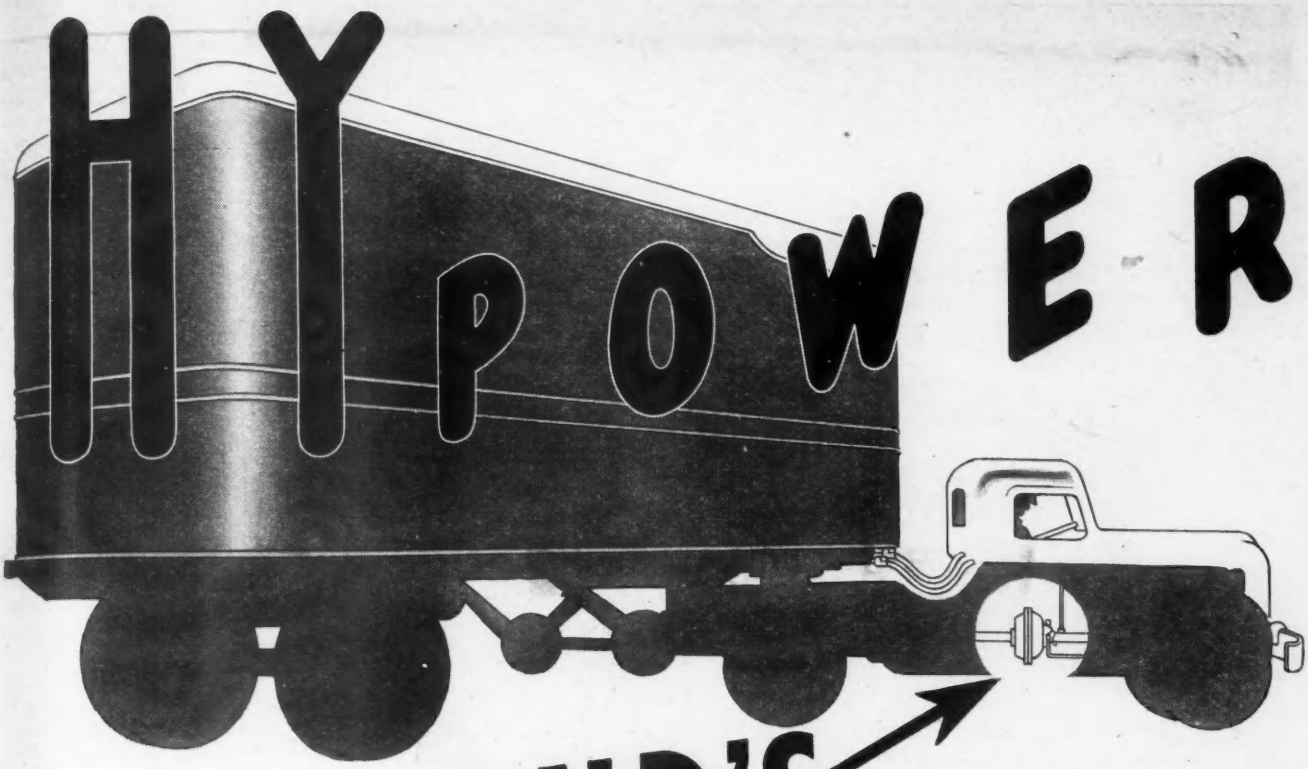
The new Flying Cloud bus also features jack-knife folding doors with an air-operated engine mounted on an aluminum extrusion over the door. The front door opens inward and the rear door opens out, and both are provided with special built-in anti-rattling devices.

Safety features include the use of anti-skid tread on step-wells and scuff plates, increased clear width of the windshield, and general use of grab rails or stanchions, especially around the doors and driver.

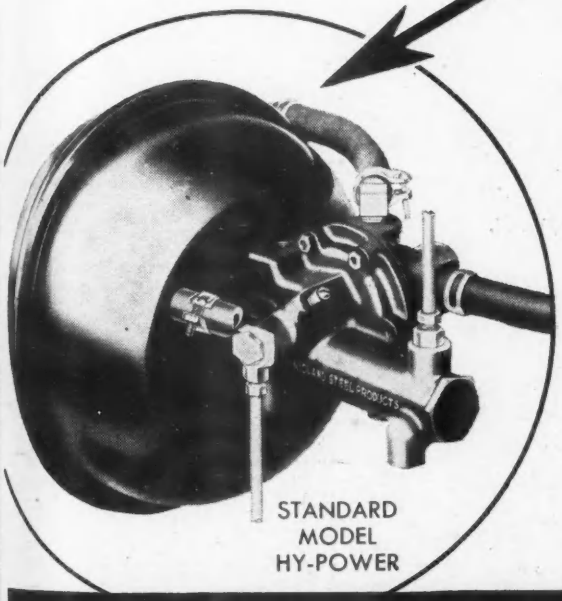
Chevrolet Janesville Plant Completes 25 Years' Service

GM's Chevrolet assembly plant at Janesville, Wis., celebrated 25 years of operation in mid-September. Acquired in 1922 by Chevrolet, the plant has been enlarged three times and currently comprises nearly 803,000 sq ft of space. It has a current capacity of 520 cars and trucks, each eight hour day.

HY POWER



MIDLAND'S Compact, Single Unit POWER BRAKE



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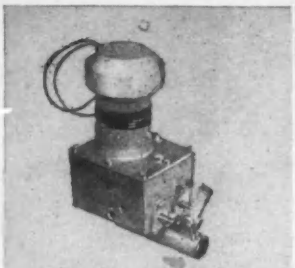
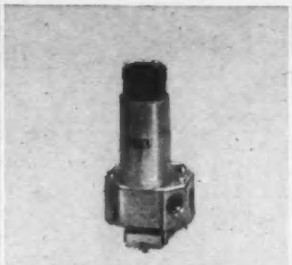


Dual Power Pack with Emergency Hand Pump, 17571.



Solenoid-Operated 4-Way Selector Valve, 14517.

Fluid Metering Pump, Series "K."

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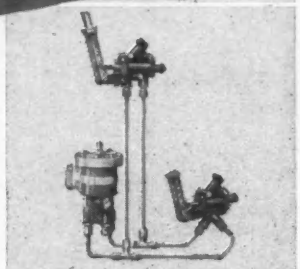
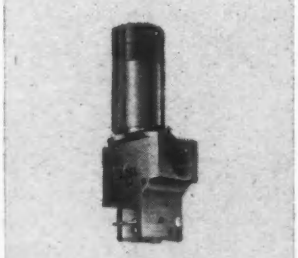
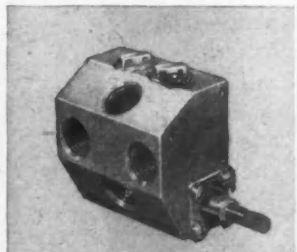
ADEL research and engineering have brought about constant improvements in hydraulic equipment to keep pace with the ever-changing aircraft industry. When you specify ADEL, you are assured of precision-built, quantity-produced equipment backed by this policy of constant improvement.



ISOdraulic Remote Controls, Type A.



Solenoid-Operated Shut-Off Valve, 13701.



"Mighty Midget" 4-Way Selector Valve, 10150.

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Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES

Narrow fluctuations in general business activity are indicated. The *New York Times* index for the week ended September 20 stands at 141.4, as against 141.7 for the preceding week and 132.9 a year ago.

Sales of department stores during the week ended September 20, as reported by the Federal Reserve Board, equaled 301 per cent of the 1935-39 average, as compared with 291 in the week before. Sales were eight per cent above the corresponding distribution a year earlier, as against a preceding decrease of one per cent. The total in 1947 so far reported is seven per cent greater than the comparable sum in 1946.

Electric power production declined slightly in the week ended September 20. The output was 10.4 per cent above the corresponding amount in 1946, as compared with a like advance of 11.8 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 931,072 cars, 0.9 per cent more than the figure for the week before and 3.6 per cent above the corresponding number recorded last year.

Crude oil production in the week ended September 20 averaged 5,199,900 barrels daily, or 17,400 barrels less than the preceding average but 424,750 barrels above the comparable output in 1946.

Production of bituminous coal and lignite during the week ended September 20 is estimated at 12,240,000 net tons, 2.9 per cent less than the output in the week before. The total production in 1947 so far reported is 15.8 per cent above the corresponding quantity in 1946.

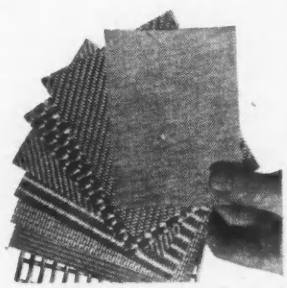
Civil engineering construction volume reported for the week ended Sept. 25, according to *Engineering News-Record*, is $135,183,000, or 49 per cent more than the preceding weekly figure and 61 per cent above the comparable sum in 1946. The total recorded for 39 weeks of this year is one per cent more than the corresponding amount in 1946. Private construction is seven per cent below that a year ago, but public construction has increased by 13 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended September 20 is 158.1 per cent of the 1926 average, as compared with 157.4 for the preceding week and 123.8 a year ago.

Member bank reserve balances decreased $297 million during the week ended September 24. Underlying changes thus reflected include an increase of $179 million in Reserve bank credit and an advance of $560 million in Treasury deposits with Federal Reserve banks, accompanied by a reduction of $77 million in money in circulation.

Total loans and investments of reporting member banks increased $422 million during the week ended September 17. An increase of $139 million in commercial, industrial and agricultural loans was recorded. The sum of these business loans, $12,858 million, shows a net increase of $2,946 million in 13 months.

Look at this answer to Screen and Filter Cloth problems



ALL WEAVES AND MESHES! Longer-lasting wire cloth of Monel, Nickel or Inconel is available in all weaves and meshes. Many weaves actually cost less than cloth of less durable metal.

Filter or screen elements stay on the job longer when made of Monel*, Nickel or Inconel*.

For these are the "task metals" of industry.

Compare them with any fabric or metal cloth that is causing you trouble. Wire cloth of these metals is rustless . . . corrosion-resisting . . . strong...tough. It endures high temperatures. It stands abrasive wear.

Its longer service life means fewer replacements . . . fewer operating hours lost.

Many equipment manufacturers already have standardized on this durable wire cloth to free their customers from troubles with strainers and filter elements! Maybe your manufacturer is one of them. But maybe he isn't. So speak to him. Tell him you want the extra protection of the "task metals" wherever filters, strainers or screens are used.

Send for our booklet: "Established Weavers of Monel, Nickel and Inconel Wire and Filter Cloth."

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67 Wall Street, New York 5, N. Y.

EMBLEM OF SERVICE
INCO
TRADE MARK

Monel* Nickel Inconel*

*Reg. U. S. Pat. Off.

"Task Metals" for Industry

New Method of Electroless Plating Based on Chemical Reduction

A NEW method for plating nickel and cobalt on metal surfaces without the use of electric current has been developed by the National Bureau of Standards. This process, known as electroless plating, involves the chemical reduction of a nickel or cobalt salt with hypophosphite, in hot solution through the catalytic action of the metal upon which deposition occurs.

The National Bureau of Standards states that this electroless plating is similar to bright nickel electrodeposits, and that it has a purity of 93 to 97 per cent. Since the coating can be made as hard as tool steel, the method is expected to prove useful where hard, wear-resistant surfaces are required, as in bearings. Also, the process is particularly applicable to the plating of recesses, irregular-shaped objects and enclosed areas such as tubes, where a centered internal electrode with special current leads would be needed in electroplating.

A unique feature of the electroless process is the catalytic initiation of the reaction by the following metals: iron or steel, nickel, gold, cobalt, palladium and aluminum. Unless one of these metals is introduced into the solution, no reaction takes place. Once started, the reaction continues at the metallic surface and only rarely occurs in other parts of the bath. For this reason, the containing vessel should be of glass, plastic or other noncatalytic material.

Objects to be plated are cleaned by any of the accepted procedures and are given an acid dip before being suspended in the hot solution. The rate of deposition is about the same as in barrel electroplating, ranging from 0.0002 to 0.0008 in. per hr, depending upon the type of solution used. During the process, the pH must be kept within a certain range, and if the operation is of long duration, the nickel salt and hypophosphite are replenished at regular intervals.

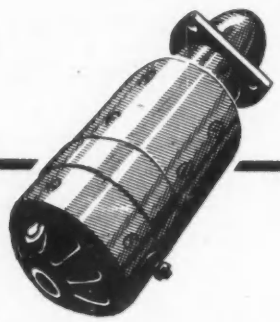
Electroless plating on noncatalytic metal surfaces may be accomplished in two ways. If a film of palladium or rhodium of nearly monatomic thickness is first applied by chemical replacement on a noncatalytic metal, deposition of nickel or cobalt will occur on the activated surface. Electroless plating of copper may be carried out in this way. A second method of initiating the reduction is to bring a less noble metal, such as iron or aluminum, in contact with the noncatalytic metal while it is immersed in the hot electroless solution. Once the process has been started, it continues because of the catalytic action of the initial deposit.

As formed, the electroless nickel deposits are brittle but become ductile when heated. These deposits are harder than the ordinary electrodeposited nickel, and upon heating their hardness is still further increased.

The adhesion of the nickel deposit to mild steel is such that it cannot be flaked off by bending, but on high-carbon steel this property is less satisfactory. In salt-spray tests on steel coated with 0.0002, 0.0005 and 0.001 in. of electroless nickel, in comparison with similar panels coated with electrodeposited nickel, the protective value of the two types of coatings was virtually the same. However, the electroless cobalt does not compare so favorably with electrodeposited cobalt.

The yield or efficiency of the reduction based on the decomposition of hypophosphite is 37 and 66 per cent for nickel and cobalt, respectively. About 2 grams of nickel or nearly 4 grams of cobalt are reduced by 10 grams of sodium hypophosphite. Because of the moderate yield and the present high cost of sodium hypophosphite, the process is expensive. Extensive commercial use of electroless plating is thus dependent upon a reduction in the price of this chemical.

6 out of 9*



leading makers of starters use

OAKITE CLEANING MATERIALS

*rated AAAA in Thomas' Register

WE'RE not taking bows by pointing to that overwhelming preference. We're simply saying that when two-thirds of the 4A makers of starters specify and use Oakite materials, they are getting effective cleaning that keeps per unit cost down. Ample proof lies in their plants' records of thorough degreasing, safe descaling, dependable rust-proofing, speedy paintstripping.

How YOU Can Profit

Probably your manufacturing set-up includes many vital cleaning jobs. To meet the requirements of those jobs, Oakite has developed over 70 alkaline, solvent and acidic type materials. Whether you use dip, spray or electrolytic cleaning methods, there's an Oakite material built for the job . . . one sure to handle it efficiently at low cost. For help on any cleaning problem drop a note to Oakite Products, Inc., 28A Thames St., New York 6, N. Y. Your inquiries invited; quickly answered.

OAKITE

REG. U. S. PAT. OFF.

SPECIALIZED CLEANING MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. & Canada

additional building will mean fast deliveries on all gasket and oil seal orders

NO MORE delays . . . no job tie-ups . . . no snarled schedules because of slow gasket deliveries! For Victor will fill all orders with a speed that will enable you to keep your work rolling—right on time!

How can we do it? Look at that building we recently acquired. Five stories. 200,000 square feet, railroad tracks on two sides, six truck platforms. And all of it will be devoted to storing, assembling, packing, and shipping.

That means that every one of our 90,000 items will be handled swiftly and accurately to fill your needs.

We're proud of our position as the country's largest producer of gaskets, oil seals, and packings. And every member of our organization is pledged to uphold this position—to offer you a better product, and *get it to you faster!*

To this end, in our newly added building we will strive to fill as many orders as possible on the same day they are received . . . for your convenience.

***Our original plant,** containing nearly eleven acres of floor space, at 5750 W. Roosevelt Road, Chicago, will now be used exclusively for manufacturing. Thus, the facilities which made Victor the country's largest producer of gaskets will now be even greater to meet your increasing demands.*

VICTOR

GASKETS • • OIL SEALS

General News

(*Continued from page 23*)

Bureau of Mines Examines Adequate Ventilation Methods

The ventilation of plants, warehouses, and garages is the subject of a recent Bureau of Mines study on methods of eliminating carbon monoxide and other dangerous gases which emanate from gasoline powered engines operated within such structures. The report is designed to aid in working out safe ventilating systems, and data are presented in the report that may be used in making estimates of ventilating requirements.

Electric Furnace Co. Opens Michigan Office in Detroit

The Electric Furnace Co., Salem, O., has opened a Michigan district office in Detroit with B. C. Thompson as district manager in charge.

Charles Hook to Get ASM Medal for 1947

Charles R. Hook, president, American Rolling Mill Co., Middletown, O., will receive the American Society for Metals Medal for the Advancement of Research for 1947 at the ASM annual banquet in Chicago on October 23.

(*Turn to page 96, please*)

ROCKFORD

SPRING – LOADED
CLUTCHES

LIGHT PEDAL PRESSURE
CUSHIONED ENGAGEMENT
VIBRATION DAMPENING
ACCURATE BALANCE
DIRT EXCLUSION
HEAT DISSIPATION
LIFETIME ADJUSTMENT

* ROCKFORD Spring Loaded CLUTCHES are adjusted at the factory, to extreme accuracy, so that no further adjustment will be required during the life of the clutch facing. Any take-up that may become necessary is made at the pedal. This permanent adjustment feature saves servicing, promotes smooth engagement, and prevents grabbing and chattering.

Send for This Handy Bulletin
Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION BORG-WARNER
315 Catherine Street, Rockford, Illinois, U.S.A.

BOOKS ...

APPLIED ATOMIC POWER, by *Edward S. C. Smith, A. H. Fox, R. Tom Sawyer* and *H. R. Austin.* Published by Prentice-Hall, Inc., 70 Fifth Ave., N. Y. Price $4.00.

This book, written by outstanding men in the fields of science and engineering, covers what can now be told of the history of the development, the present day scientific status, and the possibilities of application of atomic power to industrial progress. It is written in language that can be understood by the careful reader.

There are five parts to the book. The first describes the mineral uranium—the chief source of atomic energy—its geological distribution and physical characteristics. The second section deals with atom splitting—the phenomenon of fission—and how it produces atomic energy. The third part gives a summary of the development of atomic energy and explains the problems that are encountered in the production of plutonium.

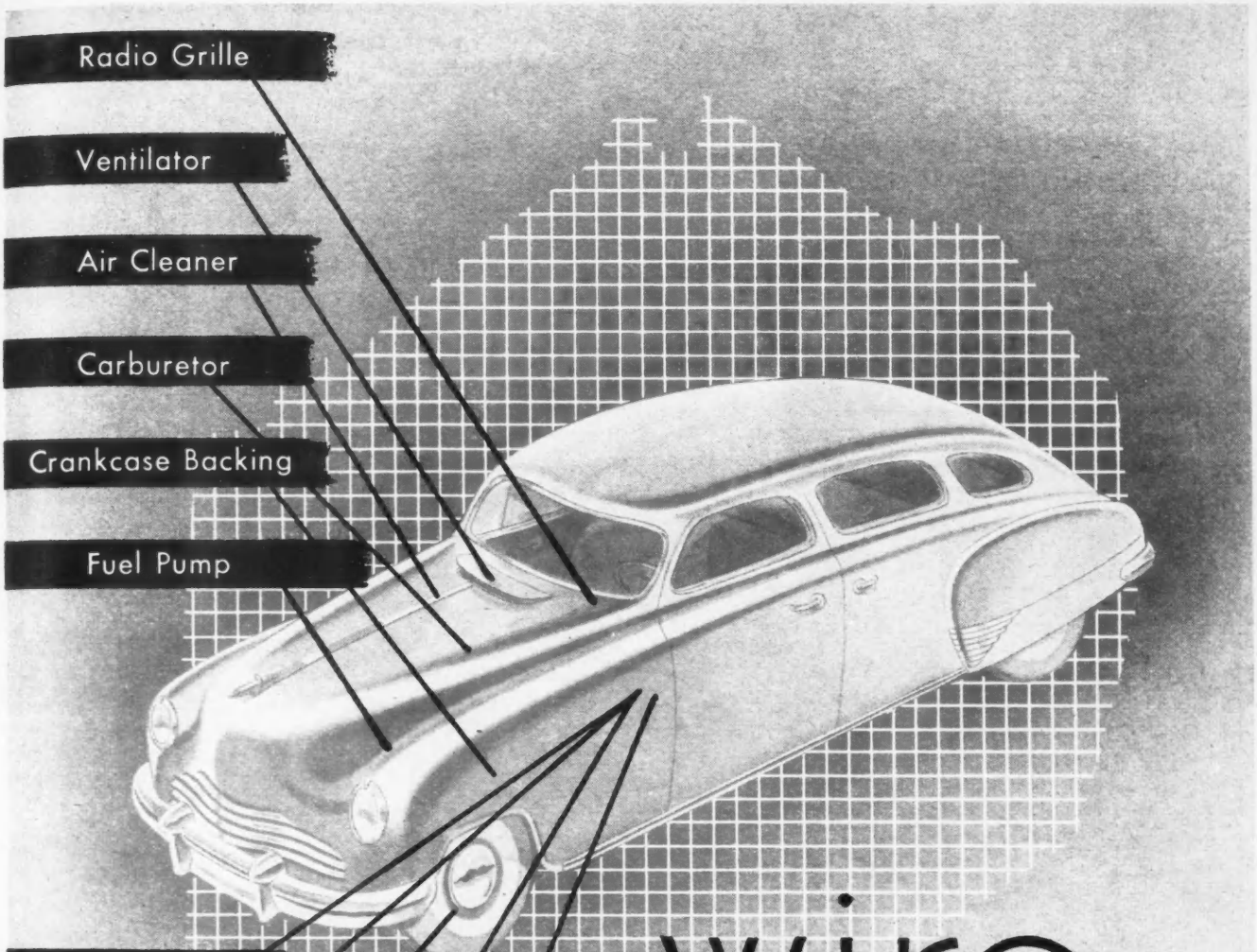
The fourth section describes in detail the possible methods of converting atomic energy into mechanical power. This is probably the most valuable portion of the book as it illustrates some of the ways in which the products of atomic energy may be utilized in existing machines, and the possibilities of developing plentiful power for peaceful purposes. Following this is a summary of industrial benefits from the extensive research that preceded the production of atomic materials, and a historical summary of the work on the atomic bomb. Included in the appendix is a table giving the nuclear and atomic masses of isotopes.

UNION - MANAGEMENT CO - OPERATION, by *Kurt Braun,* published by *The Brookings Institution, Washington, D. C.*

Although close co-operation between employers and unions has been undertaken in relatively few instances so far, it has outgrown the stage of wishful or fearful thinking in a number of industrial areas. The clothing industry is one of them.

The author examines the conditions under which union-management co-operation may develop. Objections of unions and employers, as well as the reasons impelling both groups to collaboration, are analyzed. The study sets forth the problem of harmonizing co-operation with traditional views of management as to its exclusive functions, on the one hand, and with customary union policies on the other. Since co-operation is a relatively recent outgrowth of collective bargaining, the study endeavors to clarify the relationship between the two methods of industrial relations.

The clothing industry represents an example of particularly close collaboration, and of an especially high rate of survival of co-operative schemes. The author shows how union-management co-operation has developed in this industry and how it functions. The study takes up collaboration in wage, profit, price, employment and welfare matters. It analyzes joint plans to regulate business fluctuations and trade practices and to improve efficiency, sales and industrial peace. The significance of these activities for other industries is indicated. The analysis should be useful to economists, business men, union officers and students in seeking, by direct co-operation, to find a way out of present difficulties in industrial relations.



wire cloth

FOR THE AUTOMOTIVE INDUSTRY

Wire cloth should be "tailor made" to meet *all* the various special uses of the automotive industry *satisfactorily.* Whatever the requirements—whether weave, mesh or finish of the cloth... or the metal, alloy, temper, flexibility, workability or diameter of its wire—Reynolds engineers, metallurgists and weaving experts can and will design and weave it *to your specifications!* Consult them at no cost or obligation. Send today for your copy of Reynolds new thirty-two page catalog.

REYNOLDS WIRE CO.
DIXON, ILLINOIS

Reynolds Industrial WIRE CLOTH

General News

(*Continued from page* 94)

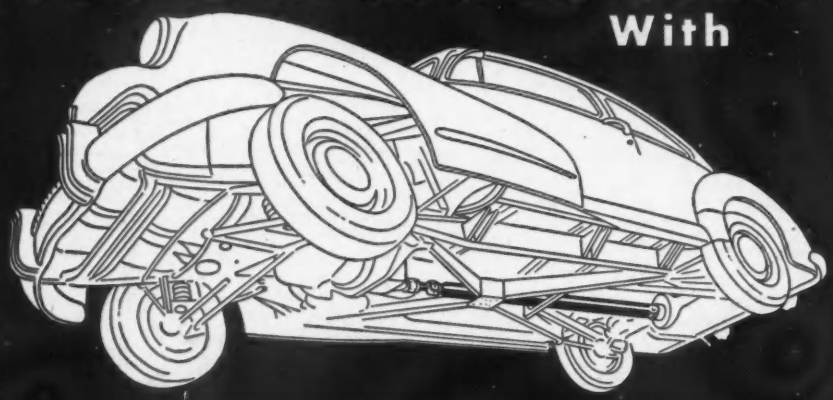
Great Lakes Steel Increases Sheet Capacity 70 Per Cent

Capacity of cold rolled sheet steel at the Ecorse Plant of Great Lakes Steel Co. will increase 70 per cent after the completion in December of the current $40 million expansion program, which has been in progress for two years. Great Lakes also has under construction open hearth facilities to increase ingot capacity 30,000 to 40,000 tons monthly by November or December.

American Standards' New List Available

The American Standards Association is making available a new listing of its 874 standards, free of charge, obtainable from the office, 70 East 45th Street, New York 17, N. Y. Covering 874 standards, it includes additional revised standards, approved since January 1947 issue of all American Standards.

YOU CAN LOWER COSTS With



MECHANICS *Roller Bearing* UNIVERSAL JOINTS

The slip-on-the-transmission-shaft feature of this MECHANICS Roller Bearing UNIVERSAL JOINT eliminates the need for the conventional splined stub shaft, thus reducing cost and weight. Let our engineers show you how this and other MECHANICS features will help give your product competitive advantages.

MECHANICS

MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner
2020 Harrison Avenue, Rockford, Ill. Detroit Office, 7-234 G. M. Bldg.

SAE Fuels & Lubricants Meeting, Nov. 6-7, Tulsa

The SAE National Fuels & Lubricants Meeting, to be held Nov. 6-7 in Tulsa., Okla., will consider practical solutions to the technical problems involved in fueling and lubricating motor vehicle, aircraft, and diesel engines. The general chairman will be J. H. Baird, of Lubri-Zol Sales Co., Tulsa. The program follows:

Nov. 6, morning: Chairman J. G. Moxey, Jr., Sun Oil Co., Marcus Hook, Pa.; "Practical Considerations in the Design of Motor Vehicle Fuel Systems for Freedom from Vapor Lock" by Gilbert Way, Ethyl Corp., San Bernardino, Calif.; "Storage Stability of Gasolines in Automotive Fuel Systems" by J. A. Bolt, Standard Oil Co. (Indiana), Chicago, Ill.

Nov. 6, afternoon: Chairman W. B. Bassett, Lubri-Zol Corp., Cleveland, O.; "Progress Report on CRC Diesel Fuel Program" by W. G. Ainsley, Sinclair Refining Co., East Chicago, Ind., W. J. Carthaus, Deep Rock Oil Co., Chicago, Ill. and C. M. Ridgeway, The Pure Oil Co., Winnetka, Ill.; "The Effect of Diesel Fuel Characteristics on Engine Deposits and Wear" by L. A. Blanc, Caterpillar Tractor Co., Peoria, Ill.; "Naval Experimental Station Experience with Diesel Lubricating Oils" by W. F. Joachim, W. E. Robbins, M. S. Gordon and T. G. Timberlake, all of U. S. Naval Engineering Experiment Station, Annapolis, Md.

Nov. 6, evening: Chairman J. M. Campbell, General Motors Corp., Detroit, Mich.; "The Petroleum Industry Public Relations Program" by W. J. Arnold, The Pure Oil Co., Chicago.

Nov. 7, morning: Chairman J. E. Kline, Standard Oil Co. (Indiana), Chicago; "Evaluation of Light Aircraft Engine Lubricants" by W. J. Backoff, N. D. Williams, K. Boldt and J. G. Hall, The Pure Oil Co., Winnetka; "Lubrication Problems Encountered in Light Plane Engines" by C. T. Doman, Aircooled Motors, Inc., Syracuse, N. Y.; "Some Aspects of Valve Burning and Sticking" by J. A. Newton, Thompson Products, Inc., Cleveland.

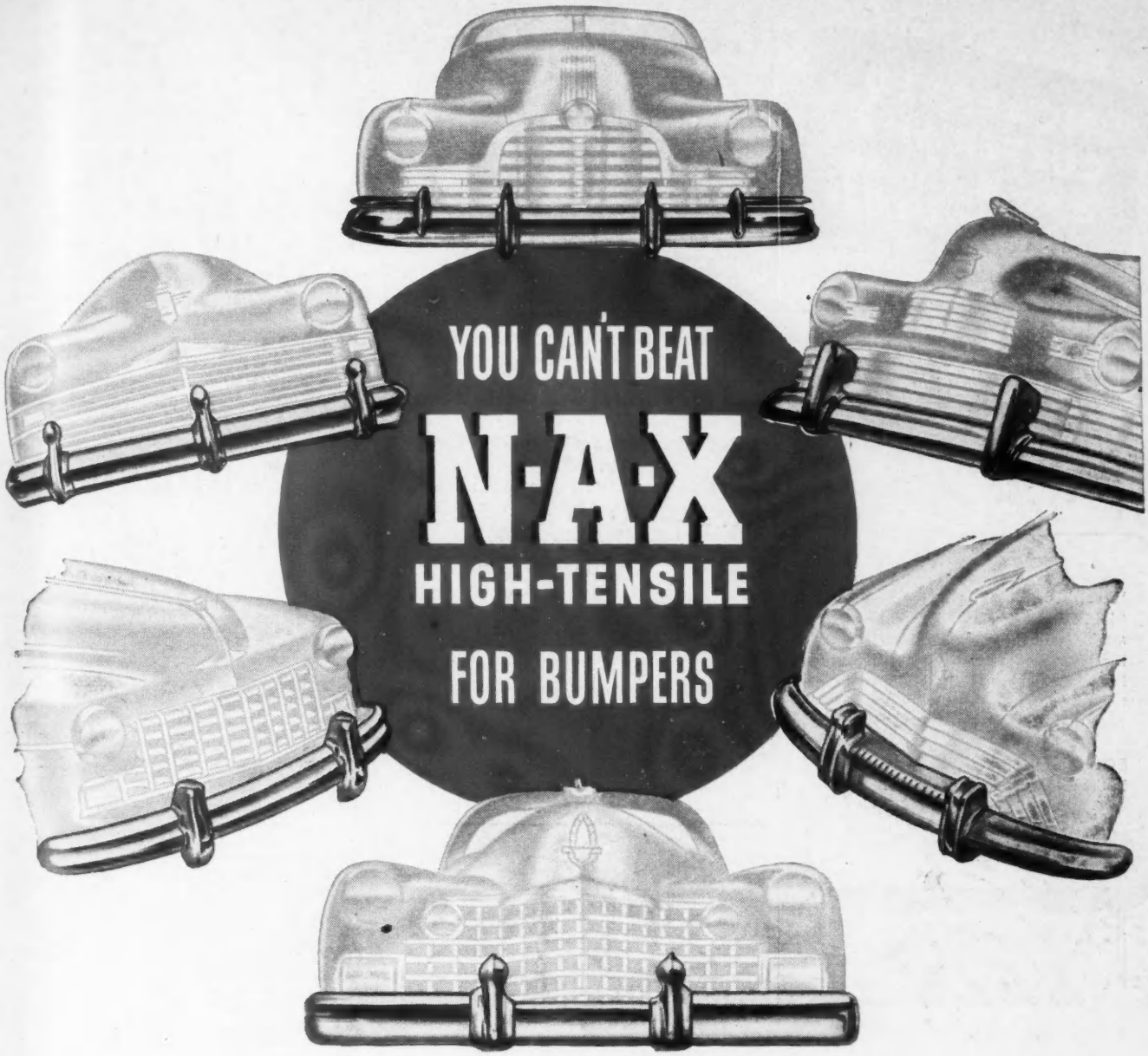
Nov. 7, afternoon: Chairman C. O. Tongberg, Standard Oil Development Co., Elizabeth, N. J.; "Preparation and Properties of High Viscosity Index Motor Oils" by W. L. Van Horne, Rohm and Haas Co., Philadelphia, Pa.; "Sub-Zero Automotive Crankcase Oils" by E. W. Uphem, Chrysler Corp., Detroit, and H. C. Mougey, Research Laboratories Div., General Motors Corp., Detroit.

Nov. 7, evening: Chairman Mr. Baird; "The Geography of Oil" by C. O. Willson, editor, *The Oil & Gas Journal*, Tulsa.

UAW-CIO Considers Extending Coops to Oil and Tire Sales

As a result of cooperative food purchasing ventures by UAW-CIO locals in Detroit and Michigan, the union is talking of extending its activities into the fields of oil and tires. The plan is only in the talking stage at present. The prevailing opinion is that while the food cooperatives currently are enjoying considerable popularity because of large volume, the union would soon get discouraged in trying its hand at retailing other lines of merchandise for which it has no particular training.

(*Turn to page* 98, *please*)



Bumpers and similar parts that require good cold-forming quality in steel are stronger and more economical to produce when made of N-A-X HIGH-TENSILE.

N-A-X HIGH-TENSILE's resistance to deformation (denting) is 60% greater than the denting-resistant quality in carbon steel. Its inherently fine grain and higher hardness provide a better surface texture for plating.

If you have parts requiring a combination of high strength, good formability and better surface texture, it will pay you to investigate N-A-X HIGH-TENSILE steel.

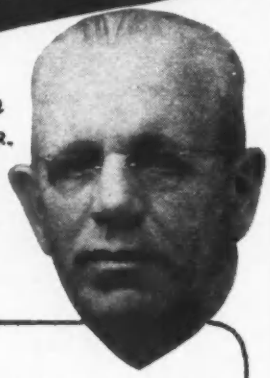
SAE 950 is synonymous with N-A-X HIGH-TENSILE STEEL

GREAT LAKES STEEL CORPORATION

N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN • UNIT OF NATIONAL STEEL CORPORATION

INCREASED CUTTER LIFE 3 to 4 times with SOLVOL*

... reports
E. J. GRAHAM, SR.
D. A. Stuart
Oil Co.
Representative



"Stuart's SOLVOL* was put in on a trial basis for use in Cincinnati Milling Machines on high carbon alloy steel. High speed alloy cutters were used and it was found that SOLVOL* increased the cutter life three to four times of what they had been getting.

"This customer is well pleased with SOLVOL* and will continue to use it in the future on these machines."

Signed: E. J. Graham

*SOLVOL

The SUPER Soluble Liquid Cutting Compound

When conventional soluble products fall just short of giving the desired results, and yet conditions of the job seem to call for an emulsion, then the use of Solvol, Stuart's *super* soluble, is indicated. Solvol is more than just a high grade emulsifiable cutting fluid. It is a unique product incorporating extra lubricating qualities which enable it to perform metal cutting jobs beyond the scope of other soluble products. It is a stable, homogeneous compound which mixes readily with water to form an emulsion rich in cutting quality. ¶ The performance report above is typical, you can't beat the right Stuart oil correctly applied to the job. Let a trained Stuart representative help you to improve production and quality. SOLVOL literature on request.

STUART *service goes with every barrel*

WRITE FOR DETAILS

D. A. Stuart Oil Co.

2733 SOUTH TROY STREET, CHICAGO 23, ILL.

General News

(*Continued from page* 96)

Commerce Data On Free Piston Engines

Important recent developments in free piston engines are outlined in a new Commerce Dept. publication, "Literature and Patents on Free Piston Machinery." The reference work presents lists of technical periodicals carrying these developments between 1935 and 1944. First presented in 1944 as a Navy Dept. research memorandum, the new compilation is designed to aid researchers in the gas turbine and diesel engine fields, according to the Commerce Dept.'s Office of Technical Services. The compilation is available from OTS.

K-F Foundry Div. Boosts Casting Output 100%

The company reports that since it purchased a foundry at Dowagiac, Mich., three months ago, it has stepped up production of gray iron castings to more than 100 tons a day or double the output prevailing at the time of purchase. The K-F Foundry Div. is now casting a large portion of engine parts, with the exception of the engine block.

Move Aircraft Std. Parts' Offices to Newark, N. J.

The Aircraft Standard Parts Co. Div., Breeze Corporations, Inc., recently moved its general offices from Rockford, Ill., to Newark, N. J.

Commerce Report Analyzes Tatra Car

Analyzing the advantages and disadvantages of the Czech Tatra V-8 rear-engined car, report PB-75857, titled "Tatra Car, Type 87 V-8, Air-Cooled Engine at Rear" is now on sale at the Office of Technical Services, Department of Commerce.

Obituary

John Thomas Smith

John Thomas Smith, 68, formerly vice-president and general counsel of General Motors Corp., died suddenly on Sept. 28 in San Francisco.

Heatley Green

Heatley Green, 69, president of Automatic Products Co., and pioneer Detroit automobile parts manufacturer died recently.

AUTOMOTIVE INDUSTRIES Goes into Leading Plants in the Automotive and Aircraft Industries

YA

ENGINE COOLING

Radiators

FOR

Motor Trucks, Tractors, Combines, Industrial Trucks, Compressors, Locomotives and Power Plants.

ALSO

OIL COOLERS
INTERCOOLERS
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YATES-AMERICAN MACHINE COMPANY
BELOIT, WISCONSIN